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INITIAL KH **DATE** 7/22/04

DOE/ID-10838
Revision 2
July 2004

U.S. Department of Energy
Idaho Operations Office

Remedial Design/Remedial Action Work Plan for Operable Unit 3-13, Group 6, Buried Gas Cylinders

INEEL
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National Engineering and Environmental Laboratory

DOE/ID-10838
Revision 2
Project No. 23510

Remedial Design/Remedial Action Work Plan for Operable Unit 3-3, Group 6, Buried Gas Cylinders

Published July 2004

Prepared for the
U.S. Department of Energy
Idaho Operations Office

ABSTRACT

This *Remedial Design/Remedial Action Work Plan* outlines the removal, characterization, treatment, and/or disposal of buried gas cylinders (Group 6) for Waste Area Group 3, Operable Unit 3-13, at the Idaho National Engineering and Environmental Laboratory. This project complies with required actions identified in the *Waste Area Group 3 Record of Decision* and by the *Federal Facility Agreement/Consent Order*.

The buried gas cylinders sites of concern include CPP-84 and CPP-94. CPP-84 contains between 40 and 100 construction gas cylinders that have been buried below the ground surface. After excavation, these cylinders will be segregated using flammability as the criteria. Sampling of these cylinders is required to identify on-Site or off-Site treatment options. Soil sampling will be performed to verify that contaminants have not been released to the surrounding environment. The sites will be backfilled and revegetated as required. CPP-94 consisted of six hydrofluoric acid cylinders. Five of these cylinders were empty and one cylinder had residual volumes of product. All cylinders at CPP-94 have been removed or are stored in compliant storage. The only field activities required to complete the removal action at CPP-94 are soil sampling and site reclamation.

This *Remedial Design/Remedial Action Work Plan*, together with the *Waste Management Plan* and the *Data Management Plan* constitute the primary documents to support the removal action. These plans provide guidance on the safe and compliant excavation, segregation, characterization, treatment, disposal, verification, and reporting requirements.

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TABLES

ACRONYMS

ACM	asbestos-containing material
ALARA	as low as reasonably achievable
ARARs	applicable or relevant and appropriate requirements
ARDC	Administrative Records and Document Control
ASA	auditable safety analysis
BFB	bromofluorobenzene
BBWI	Bechtel BWXT Idaho, LLC
CC	construction coordinator
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
COC	contaminants of concern
COPC	contaminants of potential concern
CPP	Chemical Processing Plant
CRV	cylinder recovery vessel
CRZ	contamination reduction zone
D&D	decontamination and decommissioning
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
DOT	Department of Transportation
DQOs	data quality objectives
EDF	Engineering Design File
EPA	U.S. Environmental Protection Agency
ER	environmental restoration

ERC	Earth Resources Corporation
ERP	ER Program
ERP	Emergency Response Plan
ES&H	environment, safety, and health
ES&H/QA	environment, safety and health/quality assurance
EZ	exclusion zone
FFA/CO	Federal Facility Agreement and Consent Order
FTIR	Fourier transform infrared spectrometer
FTL	field team leader
HASP	health and safety plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HF	hydrofluoric acid
HSO	health and safety officer
ICDF	INEEL CERCLA Disposal Facility
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IDHW	Idaho Department of Health and Welfare
IH	industrial hygienist
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IPMP	implementing project management plan
ISO	International Standards Organization
JSS	job safety supervisor
LDR	land disposal restrictions
LEL	lower explosive limit
MCP	management control procedure

MS	mass spectrometer
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NPL	National Priorities List
OMP	Occupational Medical Program
OSHA	Occupational Safety and Health Administration
OU	operable unit
PID	photoionization detector
PM	project manager
POC	point of contact
POD	plan of the day
PPE	personal protective equipment
PRD	program requirements directives
PSQ	principal study questions
QAPjP	quality assurance project plan
RA	remedial action
RadCon	radiological control personnel
RAO	remedial action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RD/RA	remedial design/remedial action
RE	radiological engineer
RG	remediation goals
RI/FS	remedial investigation/feasibility study

RBC	risk-based concentration
ROD	Record of Decision
SAM	Sample and Analysis Management
SC	safety coordinator
SE	safety engineer
SFE-20	storage facility exterior – tank 20
SH&QA	safety, health, and quality assurance
SO_2	sulfur dioxide
SOW	statement of work
SRPA	Snake River Plain Aquifer
SZ	support zone
TBC	to be considered
TSDF	treatment, storage, and disposal facility
VOC	volatile organic compounds
VSS	valve sampling station
WAC	Waste Acceptance Criteria
WAG	waste area group
WGS	Waste Generator Services
WMP	waste management plan

Remedial Design/Remedial Action Work Plan for Operable Unit 3-13, Group 6, Buried Gas Cylinders

1. INTRODUCTION

The Idaho National Engineering and Environmental Laboratory (INEEL) is divided into 10 waste area groups (WAGs) to better manage environmental operations mandated under a *Federal Facility Agreement and Consent Order* (FFA/CO) (DOE-ID 1991). The Idaho Nuclear Technology and Engineering Center (INTEC), formerly the Idaho Chemical Processing Plant (CPP), is designated as WAG 3. Operable Unit (OU) 3-13 encompasses the entire INTEC facility.

Operable Unit 3-13 was investigated to identify potential contaminant releases and exposure pathways to the environment from individual sites as well as the cumulative effects of related sites. Ninety-nine release sites were identified in the *OU 3-13 Remedial Investigation/Feasibility Study* (RI/FS), of which 46 were shown to have a potential risk to human health or the environment (Rodriguez et al. 1997). The 46 sites were divided into seven groups based on similar media, contaminants of concern (COC), accessibility, or geographic proximity. The *OU 3-13 Record of Decision* (DOE-ID 1999) identifies remedial design/remedial action (RD/RA) objectives for each of the seven groups. The seven groups are

- Tank Farm Soils (Group 1)
- Soils Under Buildings and Structures (Group 2)
- Other Surface Soils (Group 3)
- Perched Water (Group 4)
- Snake River Plain Aquifer (Group 5)
- Buried Gas Cylinders (Group 6)
- SFE-20 Hot Waste Tank System (Group 7).

The *Final Record of Decision* (ROD) for OU 3-13 was signed in October 1999. This comprehensive ROD presents the selected remedial actions for the seven groups, including the removal and treatment of the buried gas cylinders identified as Group 6.

This *RD/RA Work Plan* identifies and describes in detail the work elements required to remove and treat compressed gas cylinders identified at site CPP-84. This *Work Plan* also provides a detailed project budget and work schedule, including FFA/CO enforceable milestones.

Note: Throughout this RD/RA Work Plan, there are numerous reference made to the Idaho Department of Administration Procedure Act (IDAPA) hazardous waste regulatory citations. The Idaho Department of Environmental Quality (DEQ) is no longer a division under the Idaho Department of Health and Welfare (IDHW), and therefore, the applicable citations have been revised to reflect this change. The citations throughout this document however still use the previous numbering scheme to maintain consistency with the ROD that was prepared before the series had changed. For the purposes of this document where the IDAPA 16 series are referenced, it is understood that this in fact refers to the new series, IDAPA 58.

1.1 Background

INTEC is located in the south-central area of the INEEL in southeastern Idaho (see Figure 1-1). From 1952 to 1992, operations at INTEC primarily involved reprocessing spent nuclear fuel from defense projects, which entailed extracting reusable uranium from the spent fuels. Site CPP-84 is located approximately 366 m (1,200 ft) west of the INTEC security fence (see Figure 1-2). Anecdotal evidence from interviews of personnel involved and available records indicate that approximately 40 and 100 compressed gas cylinders were buried at this location after construction of the INTEC facility in 1952. Records and anecdotal evidence indicate that these cylinders contained construction gases (acetylene, compressed air, argon, carbon dioxide, helium, nitrogen, and oxygen). Site CPP-94 is located approximately 610 m (2,000 ft) to the northeast of the INTEC security fence. Six hydrofluoric acid (HF) cylinders have been retrieved from Site CPP-94.

CPP-84 characterization activities were completed to provide more information concerning the contents and spatial distribution of the compressed gas cylinders. A high-resolution magnetic survey was performed; the survey~~s~~ clearly show the boundaries of the buried cylinders at CPP-84.

1.2 Selected Remedy

The OU 3-13 ROD describes three remedial alternatives for Group 6, Compressed Gas Cylinders. These alternatives are

- “No Action” with Monitoring
- Removal, Treatment, and Disposal
- Containment.

These alternatives were evaluated on the basis of protection of human health and the environment; compliance with applicable or relevant and appropriate requirements (ARARs); long- and short-term effectiveness; reduction of toxicity, mobility, or volume of contaminants; implementability; and cost. Based on these evaluation criteria, removal, treatment, and disposal was selected as the remedy.

1.3 Scope

The OU 3-13 ROD requires the removal, treatment, and disposal of compressed gas cylinders at Sites CPP-84 and CPP-94. Cylinder removal from CPP-94 has been completed. The scope of remedial activity at CPP-84 is based on the contaminants present and the distribution of cylinders. Details concerning remedial operations at CPP-84 are provided throughout the remainder of this document.

1.3.1 Site CPP-84 Scope

The remedial activities at CPP-84 will be completed in two phases. The first phase is the excavation and segregation of cylinders from the burial grounds. Following the removal of the cylinders, confirmation soil samples will be collected from the floor of the excavation. The second phase consists of the sampling, treatment, and disposal of the cylinders. Sampling the contents of each cylinder will be conducted using remotely operated equipment and an on-Site laboratory. Based on the analytical results

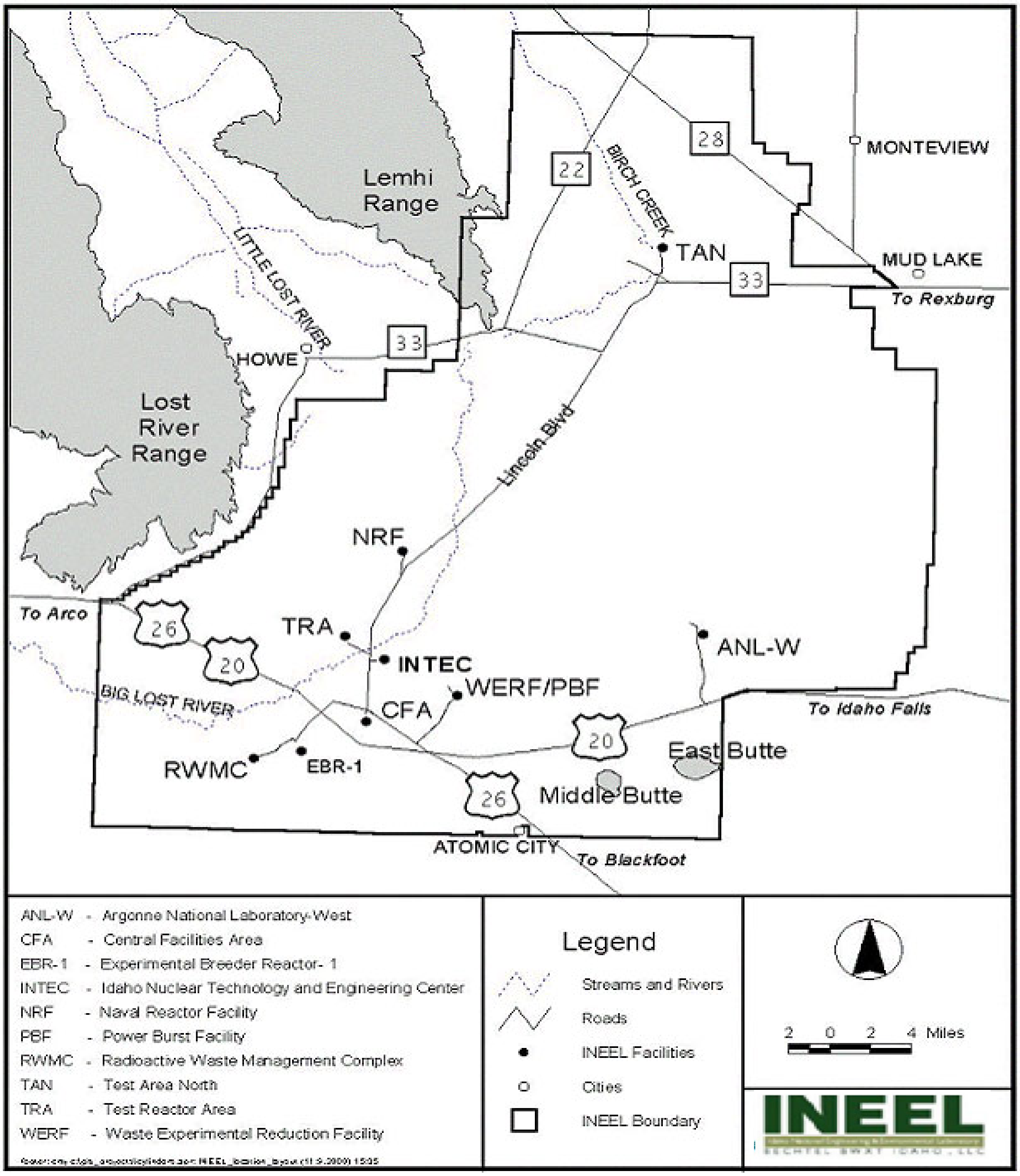

Figure 1-1. INEEL site map showing locations of facilities.

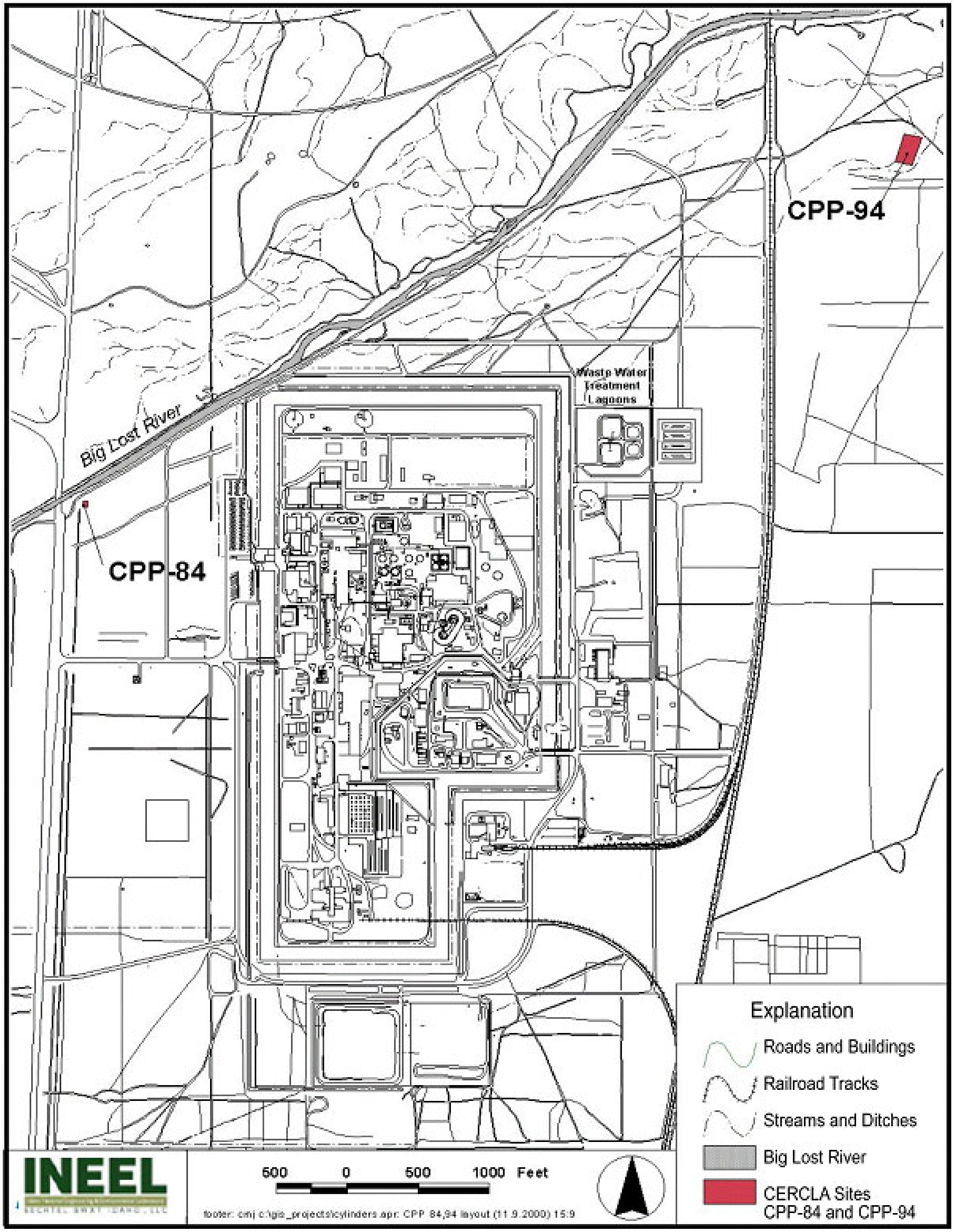

Figure 1-2. INTEC area map showing locations of Sites CPP-84 and CPP-94.

of cylinder contents, the method of treatment will be determined. It is anticipated that treatment methods will include venting of inert gases and thermal oxidation of flammable gases to render the cylinders empty. After treatment, the empty cylinders will be rendered useless and disposed at the INEEL Landfill Complex. Backfilling and site grading will complete the field operation at CPP-84.

1.3.2 Site CPP-94 Scope

The cylinder removal phase at CPP-94 has been completed. The Scope of Work used for this phase of the project is provided in Appendix D. Six cylinders were recovered and one of the six had significant pressurization due to hydrogen gas. The empty cylinders were evaluated and determined to be "RCRA empty." The valves on these cylinders were removed, holes were drilled in the cylinders, and the cylinders were disposed at the INEEL Landfill Complex. The sixth cylinder has been shipped to a commercial off-Site treatment, storage and disposal facility (TSDF) where it is being stored pending the acceptance at an appropriate treatment facility. The remaining work for CPP-94 is the post-removal sampling as detailed in the *Preliminary Characterization Plan for OU 3-13 Group 6 RD/RA Buried Gas Cylinders: CPP-84 and CPP-94* (DOE-ID 2001a) (Attachment 1). The details of the removal activities at CPP-94 will be provided in the remedial action (RA) report.

2. ORGANIZATION

The organizational structure for this project reflects the required resources and expertise to perform the work, while minimizing risks to worker's health and safety, the environment, and the public. The positions and names of the individuals in key roles at the site and lines of responsibility and communication, are shown on the organizational chart for this project (Figure 2-1). **Note:** The names on this figure and position title in this document are current as of March 14, 2001, and are subject to change. A copy of the organization chart showing the most current names will be available at the job site during the removal action. The following sections outline the responsibilities of project personnel, CFA support staff, and nonfield support staff.

2.1 Field Team

2.1.1 Environmental Restoration Field Project Personnel

All field team members, including Bechtel BWXT Idaho, LLC (BBWI) and subcontract personnel, shall understand and comply with the requirements of this *RD/RA Work Plan*. The field team leader (FTL) and health and safety officer (HSO) will jointly conduct the plan of the day (POD) briefing at the start of each shift. All tasks to be conducted, associated hazards, hazard mitigation, emergency conditions, and emergency actions will be discussed. Input will be provided by the project HSO, industrial hygiene (IH), safety engineering (SE), and radiological control (RadCon) personnel to clarify task health and safety requirements. All personnel are encouraged to provide input and ask questions for clarification of tasks and hazard mitigation methods based on previous lessons learned. Documentation of the POD will be recorded daily in the FTL logbook.

2.1.2 ER Field Construction Coordinator

The environmental restoration (ER) field construction coordinator (CC) is the individual with ultimate responsibility for the safe and successful completion of assigned project tasks. The ER field CC manages field operations; executes the work plan; enforces site control; documents site activities; and may, at the start of the shift, conduct the daily pre-job safety briefings. Health and safety issues at the site must be brought to the construction manager/ER field CC's attention.

If the ER field CC leaves the site, an alternate individual will be appointed to act as the ER field CC. The identity of the acting ER field CC shall be conveyed to site personnel, recorded in the ER field CC daily force report, and communicated to the facility representative when appropriate.

2.1.3 ER Field Team Leader

The ER FTL represents the ER organization at the project with delegated responsibility for the safe and successful completion of the project. The FTL works with the project manager (PM) to manage field sampling or operations and to execute the work plan. The FTL enforces site control, documents activities, and may conduct the daily safety briefings at the start of the shift. Health and safety issues must be brought to the attention of the FTL.

If the FTL leaves the site, an alternate individual will be appointed to act as the FTL. The identity of the acting FTL will be conveyed to site personnel, recorded in the FTL logbook, and communicated to the facility representative, when appropriate.

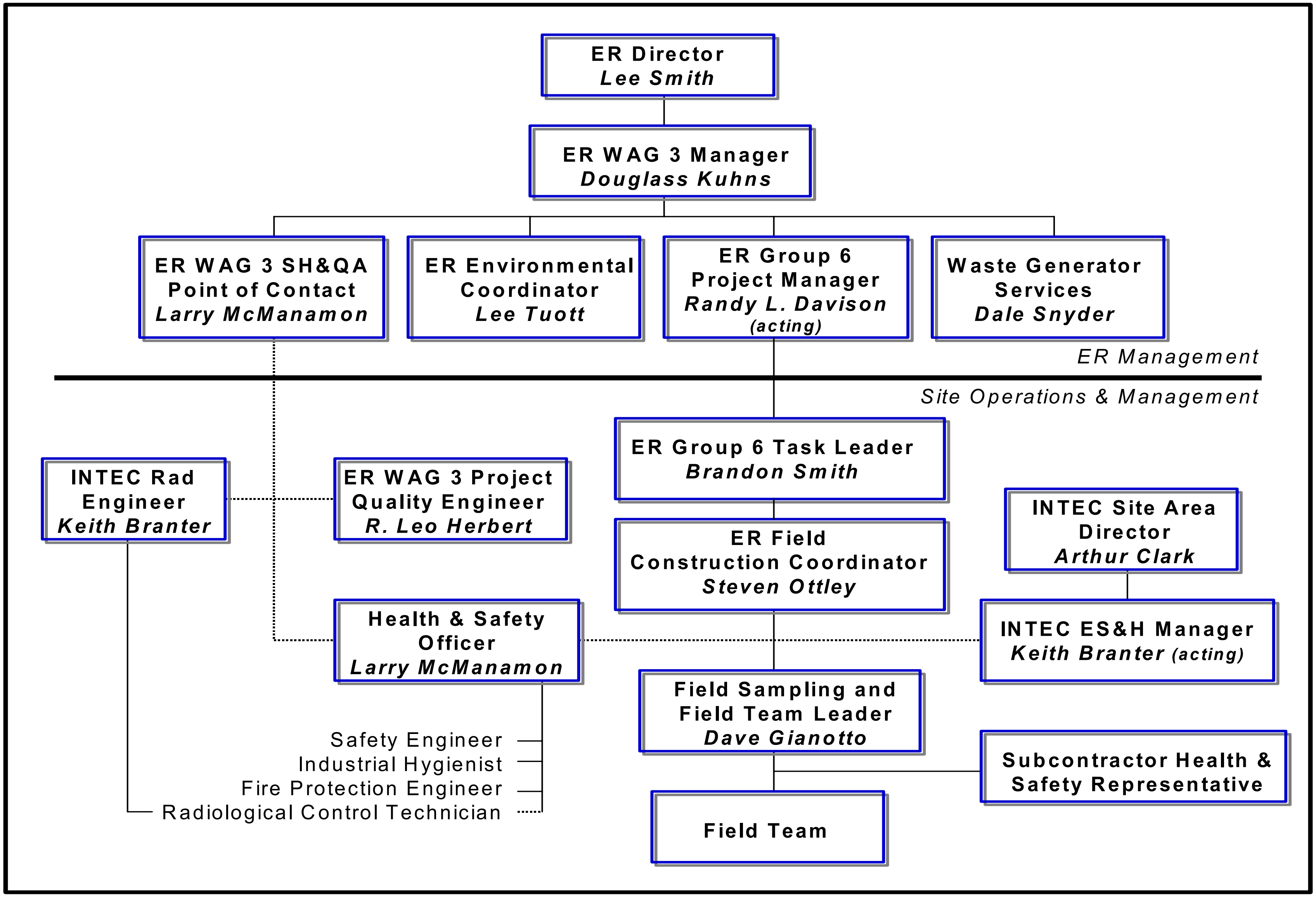

Figure 2-1. Field organization chart for the WAG 3, OU 3-13, Group 6, Buried Gas Cylinders.

2.1.4 ER Health and Safety Officer

The ER HSO is the ER representative assigned to the project who serves as the primary contact for health and safety issues. The HSO advises the safety, health, and quality assurance (SH&QA) point of contact (POC), PM, and FTL on all aspects of health and safety and is authorized to stop work at the site if any operation threatens worker or public health and/or safety. The HSO may be assigned other responsibilities, as long as they do not interfere with the primary responsibilities. The HSO is authorized to verify compliance to the *Health and Safety Plan* (HASP), conduct inspections, require and monitor corrective actions, monitor decontamination procedures, and require corrections, as appropriate. The HSO is supported by SH&QA professionals at the site (SE, IH, radiological control technician [RCT], radiological engineer [RE], environmental coordinator, and facility representative, as necessary) and the ER SH&QA POC.

Persons assigned as the ER HSO, or alternate HSO, must be qualified (per the Occupational Safety and Health Administration [OSHA] definition) to recognize and evaluate hazards and will be given the authority to take or direct actions to ensure that workers are protected. While the HSO may also be the IH, SE, or the FTL (depending on the hazards, complexity, size of the activity involved, and required concurrence from the ER SH&QA Manager) at the site, other HSO's site responsibilities must not conflict (philosophically or in terms of significant added volume of work) with the HSO's primary role.

2.1.5 Occasional Workers

All persons who may be on the site, but are not part of the field team, are considered occasional workers for the purposes of this project (e.g., surveyor, equipment operator, or other crafts personnel not assigned to the project). A person will be considered "on-site" when they are present in or beyond the designated support zone (SZ). Occasional workers per 29 CFR 1910.120/1926.65 shall meet minimum training requirements. If the nature of an occasional worker's tasks requires entry into the exclusion zone (EZ) or radiologically controlled areas, then they must meet all the same training requirements as other field team members. In addition, a site representative must accompany all occasional workers until they have completed three days of supervised field experience.

2.1.6 Visitors

All visitors with official business at the site, including INEEL personnel, representatives of Department of Energy (DOE), and/or state or federal regulatory agencies, may not proceed beyond the SZ without receiving site-specific HASP training, signing a HASP training acknowledgment form, receiving a safety briefing, wearing the appropriate personal protective equipment (PPE), and providing proof of meeting all training requirements. A fully trained site representative (such as the FTL, job safety supervisor (JSS), or HSO, or a designated alternate) will escort visitors at all times while on the site. A casual visitor to the site is a person who does not have a specific task to perform or other official business to conduct at the site. **Casual visitors are not permitted on the site.**

2.2 CFA Support Staff

2.2.1 CFA Site Area Director

The CFA site area director reports to the director of site operations and interfaces with the INTEC facility manager. The CFA site area director is responsible for several functions and processes within the CFA-controlled area that include the following:

- Performing all work processes and work packages

- Establishing and executing a monthly, weekly, and daily operating plan
- Executing the environment, safety, and health (ES&H) program
- Executing the Integrated Safety Management System
- Executing the enhanced work planning
- Executing the Voluntary Protection Program
- Maintaining all environmental compliance
- Executing that portion of the Voluntary Consent Order that pertains to the CFA-controlled area.

2.2.2 Radiological Engineer

Radionuclide contamination is not expected during the removal activities at CPP-84; however, the radiological engineer (RE) and RCT will be responsible for all radionuclide screening and controls. The RE is the primary source for information and guidance relative to the evaluation and control of radioactive hazards at the site. The RE will provide engineering design criteria and review of containment structures and makes recommendations to minimize health and safety risks to site personnel. Responsibilities of the RE include performing radiation exposure estimates and as low as reasonably achievable (ALARA) evaluations, identifying the type(s) of radiological monitoring equipment necessary for the work, advising the FTL and RCT of changes in monitoring or PPE, and advising personnel on the site evacuation and reentry. The RE may have other duties to perform as specified in other sections of the HASP or Company Manuals 15A (PRD-183) and 15B.

2.2.3 Radiological Control Technician

The assigned RCT is the primary source for information and guidance on radiological hazards and will be present at the site during all operations. Responsibilities of the RCT include radiological surveying of the site, equipment, and samples; providing guidance for radioactive decontamination of equipment and personnel; and accompanying the affected personnel to the nearest INEEL medical facility for evaluation if significant radionuclide contamination occurs. The RCT must notify the FTL and HSO of any radiological occurrence that must be reported as directed by Company Manual 15A (PRD-183).

2.3 Non-Field Support Staff

2.3.1 Environmental Restoration Director

The INEEL ER director has the ultimate responsibility for the technical quality of all projects, maintaining a safe environment, and the safety and health of all personnel during field activities performed by or for the ER Program (ERP). The ER director provides technical coordination and interfaces with the Department of Energy Idaho Operations Office (DOE-ID) Environmental Support Office. The ER director ensures the following:

- Project/program activities are conducted according to all applicable federal, state, local, and company requirements and agreements
- Program budgets and schedules are approved and monitored to be within budgetary guidelines

- Personnel, equipment, subcontractors, and services are available
- Direction is provided for the development of tasks, evaluation of findings, development of conclusions and recommendations, and production of reports.

2.3.2 ER SH&QA Manager

The ER SH&QA manager or designee responsibilities are to manage their resources to ensure that SH&QA programs, policies, standards, procedures, and mandatory requirements are planned, scheduled, implemented, and executed in the day-to-day operations for the ERP at the INEEL. This manager directs the SH&QA compliance accomplishment of all activities by providing administrative technical/administrative direction to subordinate staff and through coordination with related functional entities. The ER SH&QA manager reports directly to the ER director. Under the ER director's guidance, the ER SH&QA manager represents the ER directorate in all SH&QA matters. This includes responsibility for ERP's SH&QA management compliance and oversight for all ER Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and decontamination, dismantlement, and decommissioning operations planned and conducted at all WAGs, including WAG 3, INTEC, and for ERP INEEL-wide environmental monitoring activities.

The ER SH&QA manager is responsible for the management of the following technical disciplines and implementation of the programs related to these disciplines:

- RadCon personnel
- Industrial safety personnel
- Fire protection personnel
- QA personnel
- IH personnel (matrixed)
- Emergency preparedness personnel.

2.3.3 ER WAG 3 Manager

The BBWI ER WAG 3 manager shall ensure that all activities conducted during the project comply with Company management control procedure (MCPs) and program requirements directives (PRDs); all applicable OSHA, Environmental Protection Agency (EPA), DOE, U.S. Department of Transportation (DOT), and State of Idaho requirements; and that tasks comply with PLN-694 for the project. The WAG 3 manager is responsible for the overall work scope, schedule, and budget. The WAG 3 manager will ensure that an Employee Job Function Evaluation (Form-340.02) is completed for all project employees, reviewed for validation by the project IH, and then submitted to the Occupational Medical Program (OMP) for determination of whether a medical evaluation is necessary.

2.3.4 ER Group 6 Project Manager

The ER PM will ensure that all activities conducted during the project comply with Company MCPs and PRDs; all applicable OSHA, EPA, DOE, DOT, and State of Idaho requirements; and that tasks comply with PLN-694, the quality assurance project plan, the HASP, and the field sampling plan. The PM is responsible for coordination of all document preparation, field, laboratory, and modeling activities. The PM is responsible for the overall work scope, schedule, and budget. The PM will ensure that an Employee Job Function Evaluation (Form 340.02) is completed for all project employees, reviewed by the project IH for validation, and then submitted to the OMP for determination of whether a medical evaluation is necessary.

2.3.5 ER WAG 3 SH&QA Point of Contact

The ER WAG 3 SH&QA POC, or designee, directs the SH&QA compliance activities by providing technical and administrative direction to project staff and through coordination with related INTEC SH&QA functional entities. The ER SH&QA POC reports directly to the WAG 3 manager. Under the direction of the WAG 3 manager, the WAG 3 SH&QA POC represents the WAG in all SH&QA matters. This includes assisting the WAG 3 manager in being responsible for WAG 3 SH&QA compliance and oversight for CERCLA operations planned and conducted at the INTEC.

2.3.6 ER Environmental Coordinator

The assigned ER environmental coordinator oversees, monitors, and advises the PM and FTL performing site activities on environmental issues and concerns by ensuring compliance with DOE orders, EPA regulations, and other regulations concerning the effects of site activities on the environment. The ER environmental coordinator provides support surveillance services for hazardous waste storage and transport and surface water/stormwater runoff control.

2.3.7 ER Quality Engineer

A quality engineer provides guidance on the site quality issues. The quality engineer observes site activities and verifies that site operations comply with quality requirements pertaining to these activities. The quality engineer identifies activities that do not comply or have the potential for not complying with quality requirements.

2.3.8 Waste Generator Services

Waste Generator Services (WGS) personnel are responsible for the compliant management of waste generated during the project. These personnel coordinate both with the ER Group 6 project manager as well as the CC and the FTL. Their responsibilities include providing guidance on all aspects of waste characterization, waste storage, and waste disposal.

3. DESIGN CRITERIA

The design requirements for the Group 6 remedial action were developed to achieve objectives specified in the OU 3-13 ROD. The final design was driven by the selected remedy to remove, treat, and dispose of gas cylinders at each site. Through these actions, all future environmental and safety hazards posed by these cylinders will be eliminated. The criteria identified in this section will be implemented in accordance with all applicable state and federal environmental regulations, DOE orders, OSHA regulations, and industry standards. These include the following:

- Applicable environmental regulations are provided in Table 4-1, Group 6, Buried Gas Cylinders, ARARs
- DOE Order 435.1
- DOE Order 151.1B
- 29 CFR 1910 Occupational Safety and Health Standards
- 29 CFR 1926 Occupational Safety and Health Construction Standards
- Compressed Gas Association Guidance and Standards (complete list in Section 9, References).

3.1 Project Description

This section describes the removal action of cylinders at CPP-84, including verification surveys, cylinder and soil sampling, treatment, and disposal. An expedited remedial action of the cylinders at CPP-94 has been completed. The post-removal characterization of the soil, excavation and backfilling of any contaminated soil (if necessary), and site regrading will still be performed at CPP-94.

Records indicate that the cylinders buried at CPP-84 were used during the initial construction of INTEC, completed in 1952. These records include maintenance logs from Igloo 638, chemical index sheets from the 660 Cylinder Dock, and interviews with INTEC personnel. The compilation of this information indicates that cylinder contents are limited to acetylene, compressed air, argon, carbon dioxide, helium, nitrogen, and oxygen. Accordingly, the removal action at CPP-84 is designed to facilitate the safe removal, sampling, treatment, and disposal of these gases and cylinders. Field activities described in this work plan are designed to identify hazards and to allow for the safe and proper handling of any potential unknowns. Figure 3-1 provides a graphical description of the expected condition at the site, the types of site controls/monitoring, and possible contingency planning activities. This figure is based on the assumption of the only wastes that will be encountered are cylinders containing construction gases. If other wastes are encountered, they will be safely managed in accordance with established INEEL procedures. Section 6.6 of the *Waste Management Plan* (Attachment 4) addresses how other waste types encountered will be characterized and managed. Section 7.3 of this *Work Plan* and Section 7.1.6 of the *Waste Management Plan* address how these wastes may be treated.

The removal action will be accomplished by mechanical and hand excavation. Prior to removal from the excavation site, the cylinders will be inspected for integrity. The cylinders will be preliminarily segregated into compatible groups and safely stored. Shortly after the removal action, the cylinders will be sampled for identification purposes and appropriately treated onsite. The treatment approach includes venting to the atmosphere for inert gases, and thermal oxidation of nontoxic, flammable gases.

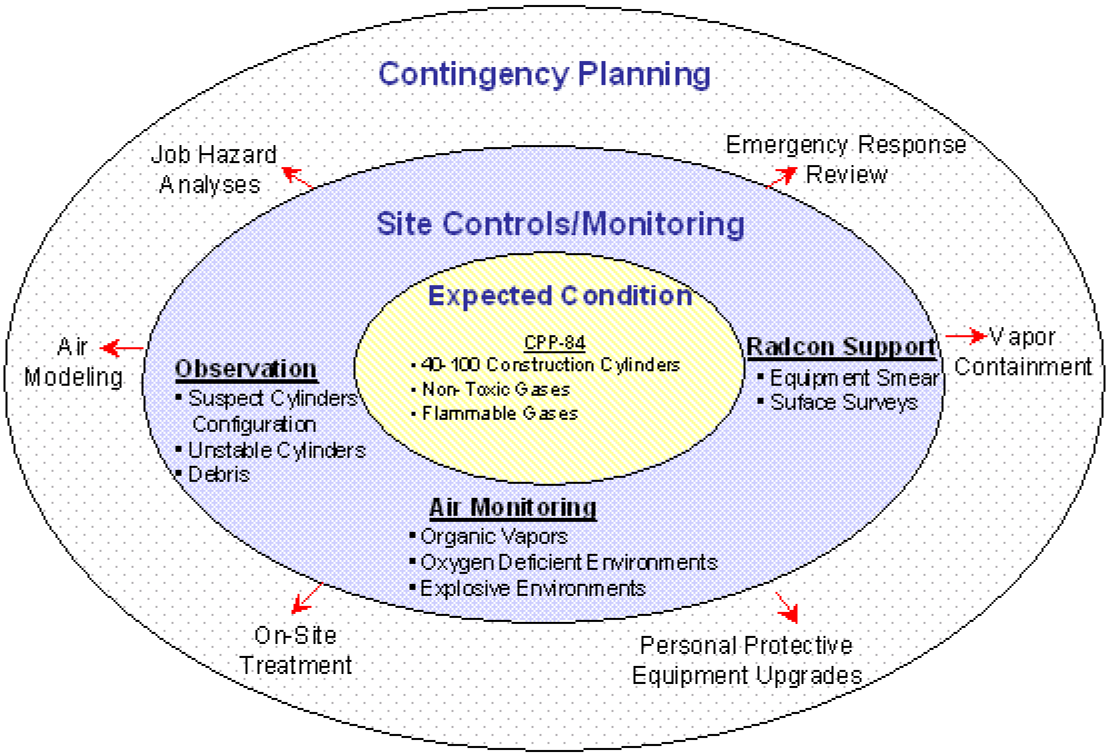

Figure 3-1. Factors that support contingency planning.

Several remedial methods are required to successfully complete the remedial action at these sites. These methods can be summarized on the basis of sampling, treatment, and disposal. A brief summary with regards to cylinder remediation is provided below.

3.1.1 Sampling Methods

Cylinder sampling methods are based solely on cylinder and valve integrity. For cylinders with operable valves, a remotely operated system, the valve sampling station (VSS) will be used. This system allows the operator to remotely view the sampling operation using video equipment. For cylinders that are in poor condition or with inoperable valves, the cylinder recovery vessel (CRV) will be used. The CRV is a remotely operated, pressure-rated, vessel that is housed within in a secondary containment chamber for the containment of fugitive gases. The cylinder is pierced within the CRV, allowing the contents of the cylinder to be sampled and analyzed.

Analysis of gases collected from each cylinder will be performed at an onsite laboratory using two primary instruments: a Fourier transform infrared spectrometer (FTIR) and/or a mass spectrometer (MS). The FTIR can provide the identification of most gases; however, the presence of elemental gases (such as oxygen, nitrogen, etc.) cannot be detected by the FTIR. The use of MS instrumentation is required for the identification of these gases. In each case, spectra generated from the samples are compared with an onsite computer library to produce the qualitative identification.

It is important to note that soil samples will be collected at the bottom of the completed excavation and from the spoil piles to confirm that no contaminants above risk-basked concentrations are left in-place. An EPA-certified, off-Site laboratory will analyze these soil samples.

3.1.2 Treatment Methods

Cylinder treatment methods are based on the contents of each cylinder, confirmed by the analytical results from the onsite laboratory. Cylinder contents cannot be assumed by exterior markings or valve configurations. Treatment methodologies are based on the assumption that only construction gas cylinders were discarded. Elemental gases, such as nitrogen, oxygen, helium, argon, and carbon dioxide, can be vented to the atmosphere. For flammable gases, such as acetylene, thermal oxidation is the preferred technology. Although not anticipated, if other gases are retrieved, efforts will be made to perform onsite treatment. Depending on the gas type, these treatment methods can range from a simple venting or flaring technique to more complex catalytic or chemical oxidation treatments. If onsite treatment is not feasible, a suitable off-Site TSDF will be identified to manage all unexpected gases.

3.1.3 Disposal Methods

The nonacetylene RCRA empty cylinders [40 CFR 261.7 (a) (1) and (b) (1)] meeting the *INEEL Waste Acceptance Criteria*(DOE-ID 2003) for industrial waste will be disposed at the INEEL Landfill Complex. These cylinders will be rendered useless through valve removal and cutting or puncturing. Wastes not meeting the acceptance criteria for the INEEL Landfill Complex will be stored pending disposition in the INEEL CERCLA Disposal Facility (ICDF) or will be transported to an off-Site disposal facility. Acetylene cylinders are constructed with a porous filler (usually asbestos) and a solvent (acetone) to provide for safe operations. Due to environmental and waste management concerns regarding these substances, after the oxidation of the cylinder contents, the cylinder bodies will be transported to an off-Site disposal facility. Prior to shipment of any waste generated by this project to a facility that is off the INEEL (off-Site), a suitability determination will be completed and provided to the Agencies in accordance with 40 CFR 300.440.

3.2 Data Quality Objectives

The data collection objectives are discussed in the context of the data quality objectives (DQOs) process, as defined by *Guidance for the Data Quality Objectives Process* (EPA 1994), discussed in the *Quality Assurance Project Plan* (DOE-ID 2002) and mandated for use in accordance with company procedures. The DQO process was developed by the EPA to ensure that the type, quantity, and quality of data used in decision-making are appropriate for the intended application. The DQO process includes seven steps, each of which has specific outputs. The seven steps with a brief explanation of each follow:

1. *State the problem*. Concisely describe the problem to be studied. Review prior studies and existing information to gain an acceptable understanding of the problem.

2. *Identify the decision.* Using new data, identify the decision that will solve the problem.

3. *Identify the inputs to the decision.* Identify the information that needs to be learned and the measurements to be taken in order to resolve the decision.

4. *Define the study boundaries.* Specify the conditions (time periods and situations) to which decisions will apply and within which the data should be collected.

5. *Develop a decision rule.* Integrate the outputs from previous steps into an "if…then" statement that defines the conditions that would cause the decision-maker to choose among alternative actions.

6. *Specify acceptable limits on decision errors.* Define the decision-maker's acceptable decision error rates based on a consideration of the consequences of making an incorrect decision. A decision

error rate is the probability of making an incorrect decision based on data that inaccurately estimate the true state of nature.

7. *Optimize the design*. Evaluate information from the previous steps and generate alternative sampling designs. Choose the most resource-efficient design that meets all DQOs.

The DQOs for this project has been separated into two distinctive groupings; (1) DQOs to support cylinder removal at CPP-84; and, (2) DQOs to support the post-removal soil sampling at both CPP-84 and CPP-94.

3.2.1 DQOs to Support Cylinder Removal

A series of shallow (<6 in.) and deep (approximately 48 in.) magnetometer readings will be the primary measurement to verify that the removal of buried cylinders is complete. The 48-in. depth for taking magnetometer readings is based on the maximum anticipated depth of burial based on the available data. Hand-probing, visual observation (debris, staining, etc.), radiological surveys, and air monitoring will also support the determination. Table 3-1 details DQOs for the cylinder removal process.

3.2.2 DQOs to Support Post-Removal Soil Sampling

It is unlikely that soil contamination will exist at either CPP-84 or CPP-94. However, post-removal soil sampling will be completed to verify that no contaminants of potential concern (COPC) are left in place after the excavation process. Table 3-2 details the DQOs for the post-removal soil sampling. The table only addresses COPCs that may be present due to the waste types expected to be excavated. If other waste types are identified during the removal action, additional parameters will be evaluated on a case-by-case basis. The sampling plans for these activities have been provided in the *Preliminary Characterization Plan for OU 3-13, Group 6, RD/RA Buried Gas Cylinder Sites: CPP-84 and CPP-94* (DOE-ID 2001a). This reference is provided in Attachment 1.

3.3 Performance Standards

The definition of performance standards is crucial to the successful completion of any remedial project. Both upper-tier (remedial action objectives) and lower-tier (remediation goals) performance standards are required to adequately define success. These performance standards are further discussed below.

3.3.1 Remedial Action Objectives

The remedial action objective (RAO) for Group 6, Buried Gas Cylinders, as defined in the ROD is to "eliminate the safety hazard posed by buried compressed gas cylinders at sites CPP-84 and CPP-94" (DOE-ID 1999). All RAOs were developed in accordance with the National Contingency Plan, and CERCLA RI/FS guidance.

3.3.2 Remediation Goals

Remediation goals (RGs) are developed to ensure that the remedial activities succeed in meeting the RAO. RGs are normally contaminant-specific, risk-based cleanup levels that are calculated for a given environmental media and contaminant exposure scenario. Since the cylinders at CPP-84 are a safety hazard and do not present a typical contaminant exposure scenario, the RG for CPP-84 is simply the removal of all buried cylinders. The Group 6 DQOs, provided in Section 3.2, specify the data required to meet the RGs and the measurements that will define a successful remedial action. Risk-based

Table 3-1. Pre-removal data quality objectives for OU 3-13 Group 6 (CPP-84 and CPP-94).

Step 1. Problem Statement	Step 2. Decision Statement	Step 3. Decision Inputs	Step 4. Study Boundaries	Step 5. Decision Rules	Step 6. Decision Error Limits	Step 7. Data Collection Design*
State the problem Insufficient data exists at sites CPP-84 and CPP-94 to adequately define the spatial extent of the buried gas cylinders. A more thorough characterization into the surface and subsurface distribution of buried cylinders is needed to guide and direct excavation and removal activities. **Note:** The intent of this data collection is to provide qualitative information and guidance to support removal activities.	***Identify the principal study question (PSQ)*** What is the spatial distribution and extent of the buried gas cylinders? ***Alternative actions resulting from resolution of the PSQ*** Alt 1: The distribution and extent of the buried gas cylinders will be better characterized. Alt 2: The distribution and extent of the buried gas cylinders will not be better characterized. ***Make Decision Statement*** Determine whether or not the distribution and extent of the buried gas cylinders has been adequately addressed.	***Identify information required to resolve the decision statement.*** High-resolution magnetic-gradient geophysical surveys to locate ferrous metal objects, particularly gas cylinders. ***Determine Action Levels*** The action level will be the presence or absence of buried metal objects. ***Confirm methods are available*** Appropriate magnetic and/or electromagnetic methods and equipment materials are available via a subcontractor. **Note:** Portable isotopic neutron spectroscopy (PINS) may be used to screen for the presence/absence of HF in the fully exposed cylinder at CPP-94. This information would be used in helping plan for cylinder removal activities.	***Specify characteristics that define the populations*** INEEL surface soils, subsurface soils, and ferrous metal objects associated with the sites. ***Define spatial boundary*** In addition to the presently defined boundaries at each site, the geophysical survey will extend to the surrounding areas (as much as one to two acres) as determined by project needs. ***Define temporal boundary*** Temporal boundaries will only be limited by field conditions (weather, site access) and project schedule. It is assumed geophysical survey results will represent the presence or absence of cylinders at the time the survey is conducted and into the future. ***Define scale in decision making*** The minimum scale of decision making will be determined by the resolution capabilities of the instrumentation (expected to be 6” × 20”). A larger decision scale may be used based on project needs. ***Identify practical constraints*** Procedures for the geophysical survey may need to take into account additional safety requirements as determined by safety specialists. Large physical objects (e.g. rocks, sagebrush) may be moved/eliminated to obtain straight uninterrupted transects.	***Specify the statistical parameter that characterizes the populations*** The intent of the geophysical surveys is to provide a qualitative characterization of each site. The only statistical parameters used for site characterization will be the number and location of suspected buried cylinders as detected by the geophysical surveys. The performance of the survey instrumentation, as specified by the instrument manufacturer, will adequately meet the requirements of the project. ***Specify the Action Levels*** Action levels will be based on presence/absence (detect/non-detect) criteria as determined by instrument sensitivity. For detects, action levels will take into account the size and intensity of the survey reading. ***State the decision rule*** *IF* buried metal objects are detected, *THEN* survey specialists and project managers will evaluate the data in making remediation decisions.	***Determine possible ranges of parameters of interest*** The range of parameters of interest are based upon the size of metal objects buried at each site. It is expected that most of the metal objects will be the size of a gas cylinder or smaller. ***Identify decision errors and choose the null hypothesis*** The two decision errors are: (a) Cylinders are not detected in an area, when in fact they are present (false negative). (b) Cylinders are detected in an area, when in fact they are not present (false positive). ***Identify decision error consequences*** (a) Cylinders may remain at the site(s) if not discovered during the geophysical survey or during removal activities. (b) Time spent searching for cylinders that are not present would add unnecessary costs to the project. ***Assign probability values to reflect tolerable decision errors*** The geophysical surveys are being used to qualitatively assess the presence and absence of buried metal objects and help direct removal actions. The measurements are taken on the grid intersections of a grid with 6" by 20" spacing. Because the instrument can detect metal ~0.9 m (3 ft) before it is directly above it, the probability of not detecting a cylinder of 6" radius (in any orientation) down to a depth of 4-5 ft (1.2-1.5m) is extremely low. Therefore, the performance and operation of the surveying equipment within the manufacturer’s specifications and instructions, and the planned resolution of the survey will provide acceptable decision error limits.	***Review existing data, DQO outputs, and develop data collection design.*** The site background and conditions will be evaluated. A local survey grid will be placed and marked in the field. Using the Rapid Geophysical Surveyor, the site will be covered with a detailed magnetic field survey made up of a series of closely spaced profiles (data spacing – 6 in. (15 cm), profile spacing – 20 in. (51 cm), approx. 50,000 points/acre) to identify cylinder burial sites and the trench perimeter. Maps will be produced that represent the findings made in the field. Following removal activities, a confirmation magnetic field survey may be conducted at each site. *For details on pre-removal data collection design, see Section 3.

Table 3-2. Post-removal data quality objectives for OU 3-13 Group 6 (CPP-84 and CPP-94).

Step 1. Problem Statement	Step 2. Decision Statement	Step 3. Decision Inputs	Step 4. Study Boundaries	Step 5. Decision Rules	Step 6. Decision Error Limits	Step 7. Data Collection Design*
State the problem Confirmatory data is needed to assess if CPP-84 or CPP-94 will require further investigation and/or soil remediation after the buried gas cylinders have been removed.	***Identify the principal study question (PSQ)*** Are there indications that COPC concentrations warrant further investigations or actions at CPP-84 or CPP-94? ***Alternative actions resulting from resolution of the PSQ*** Alt 1: No further investigation or actions at the sites will be recommended. Alt 2: Further investigation or actions at the sites will be recommended. ***Make Decision Statement*** Determine whether COPCs at CPP-84 and/or CPP-94 exceed a defined action level and require further investigation to make remedial decisions.	***Identify information required to resolve the decision statement.*** CPP-84: • Acetone concentration (soil) • Asbestos concentration (soil) *NOTE Asbestos samples will only be collected if visual evidence indicates asbestos-containing material (ACM) may be present.* • Metal concentrations (soil) The following metals will be used as indicators of leaching: – Arsenic – Barium – Beryllium – Cadmium – Chromium – Cobalt – Copper – Iron – Lead – Mercury – Nickel CPP-94: • Total Fluoride (HF byproduct) • Indicator metals as listed above ***Determine Action Levels*** The action levels for this project are derived from EPA Region III & IX Risk Based Concentration (RBC) table for metals and VOCs. The exposure scenario used for this project is the residential scenario. ***Confirm methods are available*** SW-846 methods are available for VOCs and metals. NOSH analytical methods are available for asbestos (if needed).	***Specify characteristics that defines the populations*** INEEL soils, soil particles <2 mm, absent of gross size organic materials. ***Define spatial boundary*** Excavated area: Will be defined upon the vertical and horizontal extent of the excavation activities. Initial estimates of the excavated area for CPP-84 are 20 × 30 ft (6 x 9m). Initial estimates of the excavated area for CPP-94 are 10 × 10 ft (4 × 4m). Excavated soil: Will be based upon the soil removed during cylinder excavation activities (spoil pile). ***Define temporal boundary*** Temporal boundaries are only limited by field conditions (weather, site access) and project schedule. It will be assumed that the sampling data represents both the current and future COPCs concentrations at the sites. ***Define scale in decision making*** The population to be considered at each site is the soil at the bottom of the excavation (under the removed cylinders). If visual evidence indicates it necessary, the excavated soil (spoil pile) may also be considered. The scale for decision making will be the excavation as a whole and, if necessary, the excavated soil as a whole. ***Identify practical constraints*** Procedures for excavation sampling may need to take into account additional safety requirements, depending on the depth and slope of the excavation. Procedures for sampling excavated soil will need to consider the potential for limited accessibility to all points within the spoil pile.	***Specify the statistical parameter that characterizes the populations*** The range and mean concentrations for metals, fluoride, asbestos, and acetone will be the statistical parameter used to characterize the population. **Note:** Asbestos samples will only be collected if visual evidence indicates asbestos containing material (ACM) may be present ***Specify the Action Levels*** Action levels are based on EPA Region III, & IX RBC tables for metals and VOCs (residential scenario): COPC (mg/kg) Arsenic: 3.1 E+01 Acetone: 1.6 E+03 Barium: 5.5 E+03 Beryllium: 1.6 E+02 Cadmium: 3.7E+01 Chromium IV: 2.3 E+02 Cobalt: 4.7 E+03 Copper: 3.1 E+03 Fluoride: 3.7 E+03 Iron: 2.3 E+04 Lead: 4.0 E+02 Mercury: 2.3 E+01 Nickel: 1.6 E+03 Asbestos: >1% ***State the decision rule*** *IF* a COPC concentration exceeds an RBC, *THEN* removal, remediation, and/or disposal actions will be determined.	***Determine possible ranges of parameters of interest*** Metals are expected to be in the range for INEEL soil background concentrations as listed in Rood, et al, 1995. Fluoride (total) concentrations in soil are expected to range between 100-250 mg/kg. The mean fluoride concentration is expected to be less than 250 mg/kg. Asbestos and acetone are expected to be less than the detection limit for the applicable analytical methods. ***Identify decision errors and choose the null hypothesis*** The two decision errors are: (a) Soils do not contain unacceptable COPC concentrations, when they truly do (false negative). (b) The soils do contain unacceptable COPC concentrations, when they truly do not (false positive). *Identify decision error consequences* (a) Contaminants that potentially pose a health or environmental hazard would remain at the site(s). (b) The unnecessary removal, remediation, or disposal actions would add significant costs to the project. ***Define H_o and H_A*** H_O: The soil *does not* contain COPCs significantly above background. H_A: The soil *does* contain COPCs significantly above background. ***Assign probability values to reflect tolerable decision errors*** For preliminary site investigations, less stringent statistical parameters are required for characterization. The tolerance for decision errors in this preliminary characterization are based on the following justifications: • Presently, no evidence of soil contamination exists at the site • Asbestos, if present, is non-friable and bound inside the cylinders • Unacceptably high fluoride or acetone concentrations would significantly exceed the 'gray region' of the DQO process. • High acetone concentrations would be revealed during remediation activities (industrial hygiene monitoring). • There is a low probability for extensive metal contamination from buried cylinders. • The purpose of a preliminary site investigation is to provide information for initial management decisions and to determine if further investigation is deemed necessary. (EPA's Soil Sampling Quality Assurance User's Guide*)* Based on the purpose of the characterization, the above justifications, and EPA guidance *(EPA/600/8-89/046 Soil Sampling Quality Assurance User's Guide)*, the following probability values and statistical parameters have been established: Confidence Level: 80% Minimum Detectable Difference: 30% Power: 90% Coefficient of Variation: 30% Number of samples required: 5 samples	***Data Collection/Sampling Designs*** Excavated area: Based on the DQOs of this project, a simple random sampling design combined with increment delimitation will be used for data collection. This design allows for estimating the variability (standard deviation) of the COPCs (if present) and also allows for comparing the COPCs against actions levels using a student's *t*-test. Excavated areas will be divided into grids based on cylinder location(s). Five grid locations will be randomly selected for sampling. One composite sample will be collected from the five grids (plus one duplicate). Excavated soil (Spoil pile): If evidence indicates that contaminants may be present in the spoil pile (e.g., differences in soil color, moistness, texture, odor), a splitting method using fractional shoveling combined with systematic random sampling will be used to obtain soil samples. This design allows for estimating the variability of the COPCs (if present) and allows for comparing the COPCs against actions levels using a student's *t*-test. *The established statistical parameters are as follows:* Confidence Level: 80% Minimum Detectable Difference: 30% Power: 90% Coefficient of Variation: 30% Number of samples required: • Excavations: – 5 soil samples from CPP-84 (plus 1 duplicate) – 5 soil samples from CPP-94 (plus 1 duplicate) • Spoil piles (If needed) – 5 soil samples from CPP-84 (plus 1 duplicate) – 5 soil samples from CPP-94 (plus 1 duplicate) • No equipment rinsates are required because dedicated/disposable sampling equipment will be used (see Section 3). Biased Samples: The collection of biased samples will be conducted if visual evidence indicates contaminants could be present in an area that might otherwise be missed (e.g., spoil pile, excavation portions not containing cylinders). ***For details on post-removal data collection design, see Section 3.**

concentrations for the soil (excavation floor) are defined in the Preliminary Characterization Plan for OU 3-13, Group 6, RD/RA Buried Gas Cylinder Sites: CPP-84 and CPP-94 (DOE-ID 2001a) (Attachment 1).

3.3.3 Performance Measurement Points

The performance of the remedial action will be evaluated against the Group 6 RAOs and RGs discussed above. The measuring points will be controlled temporally by the completion of the removal action. Magnetometer surveys (deep and shallow) and soil sampling will be completed at the final excavation grade to ensure compliance with the RGs. Since the removal of the cylinders will mitigate any potential future safety hazards, long-term monitoring at these sites will not be required. However, a prefinal and final inspection will be completed by the Agencies. Compliance with the performance measuring points will be discussed in the remedial action (RA) report. If it is determined that the prefinal inspection will serve as the final inspection, the date for submitting the final inspection will be 60 days after making this determination. Appendix C contains a draft copy of the prefinal inspection checklist. This checklist will be reviewed and updated as necessary upon completion of the project.

3.4 Technical Factors of Importance in Design and Remediation

The three most important technical factors in this remedial action are the number of cylinders, cylinder contents, and cylinder integrity. CPP-84 is thought to contain between 40 and 100 construction gas cylinders. This is supported by maintenance and operation records as well as interviews from INTEC personnel. These variables are further discussed in Sections 3.4.1 through 3.4.3. Other factors such as subsurface geometry (i.e. depth to basalt and maximum depth of cylinders); local soil characteristics (soil moisture content, particle grading, and frozen soil); and weather conditions (wind speed, precipitation, temperature) can also present technical challenges.

3.4.1 Number of Cylinders

The actual number of cylinders discarded at CPP-84 is a factor in determining the design of the remedial action. Records indicate that between 40 and 100 cylinders are buried at CPP-84. The design and configuration of the exclusion zone, contaminant reduction zone, and support zone are heavily influenced by the number of cylinders removed from the site. The amount of time and space required to stage, sample, and treat the abandoned cylinders is proportional to the number of cylinders removed from the site.

3.4.2 Cylinder Content

Cylinder content is the most important factor in the design of the remedial action. Records indicate that the cylinders discarded at CPP-84 contain construction gases from the construction of INTEC. These gases include acetylene, compressed air, argon, carbon dioxide, helium, nitrogen, and oxygen. This removal action is designed to safely handle, sample, and treat these gases. However, observations, field screening, or analytical results may identify the presence of other substances. Based on the type of material identified, the design of the remedial action may require modification including upgrades to PPE, construction of vapor contaminant and treatment facilities, and the evaluation of potential release and emergency response scenarios.

3.4.3 Cylinder Integrity

Cylinder integrity is another important factor that controls remedial design and remedial action consideration. If the cylinders are in stable condition and the valves are operable, the handling and sampling procedures are relatively simple. Specialized equipment is required to support the handling and sampling of cylinders with inoperable valves or unstable cylinders. For example, a cylinder may have been subject to extremely corrosive environments or the valve cap may have been damaged or “frozen” in place. Figure 3-2 shows an example of a damaged valve cap. Handling of unstable cylinders may require the use of cylinder over packs. Figure 3-3 shows an example of typical cylinder over packs. Large over pack vessels are available to handle bent, bulging, or other cylinders retrieved that will not fit into the typical cylinder over packs depicted in Figure 3-3.

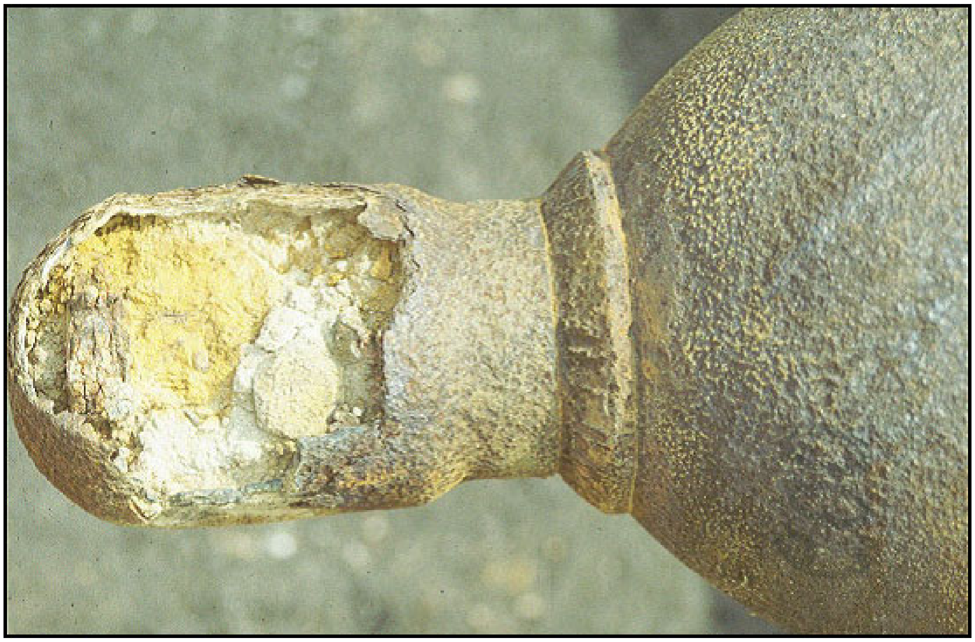

Figure 3-2. Example of damaged valve cap.

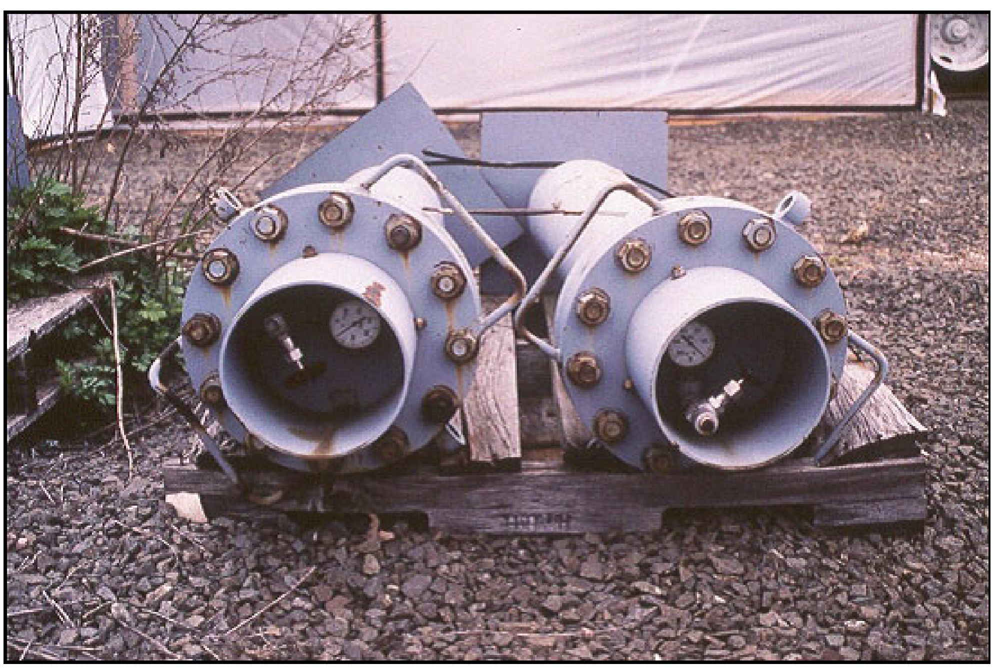

Figure 3-3. Example of cylinder overpacks.

4. DESIGN BASIS

The design of the Group 6 removal action is based upon general ROD assumptions, assumptions specific to Group 6, design assumptions, and the ARARs that are regulatory drivers. The following sections discuss these factors.

4.1 Status of Record of Decision Assumptions

General assumptions that are relative to all WAG 3 groups are presented in *Remedial Design/Remedial Action Scope of Work for Waste Area Group 3, Operable Unit 3-13* (DOE-ID 2000). These assumptions include the following:

- The requirement to begin continuous onsite substantial physical remediation within 15 months of ROD signature is planned to be met by initiation of field activities for construction of the Tank Farm Interim Action – Phase I.

- Monitoring for each group will be performed as part of the RD/RA and is separate from institutional controls.

- Remediation schedules will be based on the work breakdown structure for each group and available funding. Scheduling of remediation for the groups will meet the statutory requirements for continuous substantial physical onsite remediation within 15 months of ROD signature.

- A minimum institutional control period to the year 2095 for land use or access restrictions required to be protective will be implemented at all sites where contaminant concentrations exceeding allowable risk ranges are left in place. The continued need for land use or access restrictions will be evaluated by the Agencies during each 5-year review.

- Institutional controls prior to 2095 will consist of site access controls, radiological posting controls, and land use controls as shown in Table 11-1 of the ROD.

- Completion of the ICDF and approval to begin operations will occur prior to the start of Group 3 soil removal actions at OU 3-13.

- Contaminated soils excavated from OU 3-13 sites and other INEEL CERCLA wastes will be placed in the ICDF if they meet Waste Acceptance Criteria (WAC) that will be identified in the ICDF RA work plan.

- Groundwater contamination in the Snake River Plain Aquifer (SRPA) within the INTEC fence line will be addressed under OU 3-14.

- Contaminated media, not previously identified by the OU 3-13 comprehensive RI/FS, may be discovered within the boundaries identified for the seven groups and “No Further Action” sites, and procedures to address these potential discoveries will be added to the respective RD/RA work plans or otherwise managed under the FFA/CO.

- To the extent possible, Resource Conservation and Recovery Act (RCRA) and decontamination and decommissioning (D&D) closures of other INTEC facilities will be coordinated with RD/RA activities to minimize duplication of effort.

4.2 Summary of Record of Decision Assumptions Specific to Group 6, Buried Gas Cylinders

Assumptions that are relative to Group 6, Buried Gas Cylinders, are presented in *Remedial Design/Remedial Action Scope of Work for Waste Area Group 3, Operable Unit 3-13* (DOE-ID 2000). The discussion below includes these assumptions plus their current status. The assumption include the following:

Assumption #1

A safety evaluation will be performed and subsequently approved by DOE to determine if the cylinders at sites CPP-84 and CPP-94 can be removed and the contents properly treated and disposed without posing an unacceptable risk to workers. This evaluation will be presented in an Engineering Design File (EDF) prior to the start of the remedial design for this group.

Status of Assumption #1

An Engineering Design File (INEEL 2000a) and a hazard classification (INEEL 2000b) were completed to better define the distribution of cylinders at each site and evaluate the potential hazards to workers. The results of these studies defined the areas impacted by cylinder burial, identified the contents of the cylinders at CPP-94, and determined the hazard classification for the two sites. In addition, cylinders at CPP-94 have already been successfully removed from the site. The only field activities required at CPP-94 are post-removal soil sampling, and site grading.

Assumption #2

If it is determined that removal of the cylinders poses an unacceptable risk to workers, the sites will be capped in place with an engineered barrier pursuant to the substantive requirements of IDAPA 16.01.05.008 (40 CFR 264.310).

Status of Assumption #2

Based on the results from the Engineering Design File (INEEL 2000a) and the hazard classification (INEEL 2000b), it was determined that removal of the cylinders does not pose an unacceptable risk to workers. Therefore, an engineered barrier will not be required. In addition, cylinders at CPP-94 have already been successfully removed from the site. The only field activities required at CPP-94 are post-removal soil sampling and site grading.

The removal of cylinders at CPP-84 will be conducted by personnel with a high level of expertise in compressed gas cylinder remediation. If a situation is identified during the removal action that may pose an increased risk to workers, these personnel will evaluate the condition. An unacceptable risk would be a situation where a cylinder is identified containing a gas that is either highly explosive or toxic and that is in such poor condition that attempting to remove the cylinder would likely cause a release that is immanently dangerous to the workers. Such a condition is not anticipated based on the available evidence.

Assumption #3

If any of the soils or cylinders are determined to contain restricted listed or characteristic hazardous waste residues, the soils/debris will be treated to meet land disposal restrictions (LDRs) and subsequently disposed either on-Site at the ICDF or off-Site.

Status of Assumption #3

Soil contamination is not likely at either CPP-84 or CPP-94. However, contaminant screening (radiological and chemical) along with visual observations will assess the presence of contamination during the removal process. Post-removal soil sampling will verify that contaminants were either removed or not present at these sites in levels greater than the risk-based concentration for the COPCs identified in Table 3-2. The results of this sampling will be used to identify the final disposition of contaminated soil that is in excess of the risk-based COPC levels, thus requiring removal. The cylinders and residues of hazardous waste in empty containers will be managed in accordance with the ARARs as identified in Table 4-1.

Anecdotal evidence suggests that cylinders at CPP-84 contain construction gases. Most of these gases (oxygen, nitrogen, compressed air, argon, helium, and carbon dioxide) are unregulated and can be vented to the atmosphere. Acetylene is an ignitable characteristic hazardous waste and would carry a D001 waste code. However, LDRs do not apply since placement of the waste will not occur. If wastes are identified during the excavation of CPP-84 other than the expected construction cylinders, they will be managed and characterized in accordance with the *Waste Management Plan*. Treatment, if required, may take place at the INEEL if the waste is amenable to on-Site treatment or will be sent to an off-Site (off the INEEL) TSDF.

Assumption #4

Disposal (if required) of the empty gas cylinders will be in the ICDF.

Status of Assumption #4

The cylinders that contain the gases that are vented to the atmosphere (oxygen, nitrogen, compressed air, argon, helium, and carbon dioxide) will be rendered useless and disposed at the INEEL Landfill Complex. If the cylinders do not meet the INEEL Landfill Complex’s WAC, then they will be stored for disposal in the ICDF. Acetylene cylinders are constructed with a porous filler (usually asbestos) and a solvent (acetone) to provide for safe operations. Due to environmental and waste management concerns regarding these substances, the acetylene cylinder bodies will be transported to an off-Site disposal facility.

Assumption #5

If any cylinders require off-Site treatment, off-Site disposal is anticipated.

Status of Assumption #5

If off-Site treatment is required, then the cylinder that contained those gases will be disposed off-Site. A good example of this is the cylinder recovered from CPP-94 that contained HF. This cylinder is currently stored in an off-Site storage facility awaiting off-Site treatment and disposal.

Table 4-1. Group 6, Buried Gas Cylinders, ARARs.

Alternative/ARARs citation	Description	Applicable, or Relevant and Appropriate (R&A), or TBC	Comments
Group 6—Buried Gas Cylinders: Alternative 2—Removal, Treatment, and Disposal			
Action-specific			
IDAPA 16.01.01.650, 16.01.01.651	Idaho fugitive dust emissions	Applicable	Dust suppression will consist of wetting soils as necessary during excavation.
IDAPA 16.01.01.585, 16.01.01.586	Rules for control of air pollution in Idaho	Applicable	Will be met during treatment of cylinder contents. Cylinder contents will be vented to the atmosphere if they are nontoxic or oxidized if flammable. Toxic gases will be treated by chemical neutralization or shipped off-Site.
40 CFR 122.26	Storm water discharges during construction	Applicable	The requirements of this project's SWPPP will be met.
IDAPA 16.01.05.008 (40 CFR 264.114)	Disposal or decontamination of equipment, structures, and soils	Applicable	Decontamination facilities will be available as necessary through out the project. If disposal of soil or equipment is required, WGS will implement the project-specific waste management plan.
40 CFR 300.440	Procedures for Planning and Implementing Offsite Response Actions	Applicable	All off-Site disposal facilities (off the INEEL) will be evaluated for compliance with the CERCLA off-Site rule prior to shipment.
IDAPA 16.01.05.005 (40 CFR 261.20 through 24)	Hazardous waste characteristics identification	Applicable	No contaminated soils are anticipated that are in excess of the RBC for the COPC specified in Table 3-2. Waste generated by this action will be evaluated for characteristics of hazardous waste, as specified in the Waste Management Plan.
IDAPA 16.01.05.005 [40 CFR 261.7(a)(1), (b)(2)]	Residues of hazardous waste in empty containers	Applicable	All residuals that are considered hazardous wastes will be containerized and managed appropriately as determined in the project-specific waste management plan.

Table 4-1. (continued).

Alternative/ARARs citation	Description	Applicable, or Relevant and Appropriate (R&A), or TBC	Comments
IDAPA 16.01.05.008 (40 CFR 264.170 through 179)	Use and Management of Containers	Applicable	Substantive requirements will be met for RCRA hazardous cylinder contents or hazardous waste contaminated soils. All residuals that are considered hazardous wastes will be containerized and managed appropriately as detailed in the project-specific waste management plan.
IDAPA 16.01.05.011 (40 CFR 268)	Land disposal restrictions	Applicable	No hazardous wastes are anticipated except for D001 for acetylene. LDRs are not applicable for acetylene since placement of the waste will not occur. However, hazardous wastes will be managed in accordance with the project-specific waste management plan if hazardous waste is generated.
IDAPA 16.01.05.011 (40 CFR 268.49)	Alternative LDR treatment standards for contaminated soil	Applicable	Classification of the soil removed from the excavation as hazardous waste is not anticipated. However, hazardous wastes will be managed in accordance with the project-specific waste management plan if hazardous waste is generated.
IDAPA 16.01.05.008 (40 CFR 264.553)	Temporary units	Applicable	Areas designated near the excavations to temporarily store and treat cylinders containing acetylene or other hazardous wastes would be considered temporary units.
IDAPA 16.01.05.008 (40 CFR 264.554)	Remediation waste staging piles	Applicable	The use of an RCRA-designated staging pile is not anticipated.
IDAPA 16.01.05.008 (40 CFR 264 Subpart X)	Miscellaneous units	Applicable	The use of an RCRA-designated miscellaneous unit is not anticipated.
IDAPA 16.01.05.008 (40 CFR 264 Subpart J)	Tank systems	Applicable	The use of an RCRA-designated tank is not anticipated.

Table 4-1. (continued).

Alternative/ARARs citation	Description	Applicable, or Relevant and Appropriate (R&A), or TBC	Comments
IDAPA 16.01.05.008 (40 CFR 264 Subpart BB)	Air emission standards for equipment leaks	Applicable	No air emissions from equipment leaks are anticipated. All releases will be managed in accordance with the project-specific Spill Prevention and Response plan.
IDAPA 16.01.05.008 (40 CFR 264 Subpart CC)	Air emission standards for tanks, surface impoundments, and containers	Applicable	No air emissions from tanks, surface impoundments, and/or containers are anticipated. All releases will be managed in accordance with the project-specific spill prevention and response plan.
IDAPA 16.01.05.008 (40 CFR 264.310)	Landfills	Applicable	Applies only if cylinders are capped in place. All cylinders or soils with contaminant concentrations above risk-based levels will be removed.
Chemical-Specific			
IDAPA 16.01.05.005 (40 CFR 261)	Identification of Hazardous Waste	Applicable	Suspect soils will be segregated and sampled to identify the presence of contamination in excess of the RBC for the COPCs, as identified in Table 3-2. Wastes generated by the project will be evaluated and managed as specified in the Waste Management Plan.
Location-specific			
None identified			
TBCs			
None identified			

4.3 Summary of Detailed Justification of Design Assumptions

The specific design assumptions and the corresponding justification provide a basis for the removal action. These assumptions are as follows:

1. Forty to one hundred cylinders are buried at CPP-84.

   Only anecdotal evidence is available to support the number of cylinders buried at the site. However, numerous interviews with the equipment operators that dug the trench and buried the cylinders indicate the number of cylinders that were buried. These operators also indicated that the cylinders could have been empty, partial empty, unused, or possibly damaged. Flooding exposed these cylinders in 1957-58 and the same operators covered them again. One of these operators later located the cylinders using a metal detector and staked their location. Metal detectors were used again in 1994 to locate the cylinders.

2. The footprint of the burial grounds measures 85 ft by 25 ft, with a maximum depth of 4 ft.

   Results of magnetic field surveys were reported in the Engineering Design File – *Summary of FY-2000 Characterization Activities at OU 3-13 CPP-84 and CPP-94 (Buried Gas Cylinders)* (INEEL 2000a). Based on field surveys the dimensions of the burial trench are approximately 25 ft by 85 ft and the cylinders are estimated to be 2 to 3 (± 1 ft) ft below ground surface. This information was confirmed by field surveys.

3. Only acetylene, compressed air, argon, oxygen, carbon dioxide, helium and nitrogen are present at CPP-84.

   A review of the chemical index sheets from the 660 Cylinder Dock indicate that construction gases were buried at the site, including acetylene, compressed air, argon, carbon dioxide, helium, nitrogen, and oxygen. Anecdotal evidence from the equipment operators suggest that construction gases from Igloo 683 were buried in the trench after the construction of INTEC was complete in 1952.

4. All cylinders from CPP-84 can be vented or oxidized.

   A review of the chemical index sheets from the 660 Cylinder Dock indicate that construction gases were buried at the site, including acetylene, compressed air, argon, carbon dioxide, helium, nitrogen, and oxygen. Anecdotal evidence from the equipment operators suggest that construction gases from Igloo 683 were buried in the trench after the construction of INTEC was complete in 1952. The venting and/or thermal oxidation (flaring) of these gases do not result in releases to the environment above any reportable quantity or regulatory limit. Any potential short-term exposure risks to workers are mitigated through the implementation of the health and safety plan.

5. No radioactive components are present.

   Radiological surveys have been completed at the surface at both CPP-84 and CPP-94. No radiological levels above background have been detected.

4.4 Detailed Evaluation of How ARARs Will Be Met

The ARARs for selected remedies for the buried gas cylinders in the ROD are action-specific, chemical-specific, and location-specific. Table 4-1 summarizes the techniques for compliance with these ARARs. Table 4-1 is a reprint of Table 12-6 of the ROD with the exception of the "Comments" column. The "Comments" column has been substantially modified from the ROD to meet the specific needs of this *Work Plan*. These changes do not imply that the ROD has been modified; they are only applicable to the context of this *Work Plan.*

4.5 Plans for Minimizing Environmental and Public Impacts

One of the general purposes of the FFA/CO (DOE-ID 1991) is to "expedite the cleanup process to the maximum extent practicable consistent with protection of human health and the environment." The parties to the FFA/CO intended that any response action selected, implemented, and completed under the Agreement will be protective of human health and the environment such that remediation of releases covered by the Agreement shall obviate the need for further response action.

Every effort has been made in the planning of this project to utilize well-established and available processes and guidance, and achieve compliance with CERCLA and RCRA processes. Special consideration will be given to the disposition of dangerous or emergency conditions. If a dangerous or emergency condition is discovered that may pose "imminent and substantial endangerment to people or the environment," personnel have the authority to stop work per FFA/CO Section 29. Monitoring plans and strategies to mitigate impacts to human health and the environment include the following:

- Spill prevention and emergency response planning that details how emergency situations will be responded to and controlled

- Health and safety planning that details proper operating procedures, job-hazard analyses, and personal protective equipment throughout the project

- The use of real-time air monitors to provide early detection of releases

- Physical inspection of each cylinder for integrity prior to removal from the excavation site to minimize the potential for a release.

- Project fence boundaries and signs to prevent unauthorized entry

- Storage areas and racks with protection from wind, rain; plus sun and regular inspections of these areas to identify problem cylinders

- Detailed excavation plans that call for both mechanical and hand-digging in conjunction with real-time magnetometer probing

- Use of specially designed a grappling device that minimizes exposure to workers during cylinders handling

- A post-remediation inspection will be completed to ensure cylinder removal and verify that appropriate revegetation and grading is complete.

5. REMEDIAL DESIGN

This section outlines the activities that will be performed to meet the RAOs and RGs set forth in the ROD. The activities are discussed in the following sections: Mobilization, Excavation Operations, Cylinder Segregation and Staging, Cylinder Sampling, On-Site Laboratory Analysis, Cylinder Treatment, Cylinder Disposal, and Post-Removal Sampling. Figure 5-1 provides a graphical summary of the remedial action.

The cylinders will be managed under the Compressed Gas Associated (CGA) guidelines for abandoned compressed gas cylinders. These guidelines are specifically addressed in the CGA guidance document P-22, "The Responsible Management and Disposition of Compressed Gases and Their Containers" (CGA 1995a). The cylinders meet the criteria of "Abandoned Cylinder" as defined in P-22 and should follow the guidelines for management of such cylinders.

5.1 Mobilization

All required personnel and equipment will be mobilized to the site. The construction coordinator will direct all mobilization activities. The equipment list includes the following:

- Excavation equipment (Cat 320 or equivalent track-hoe excavator with containment grade polycarbonate operator shielding and Case 580 or equivalent back-hoe with Earth Resource Corporation [ERC] Cylinder Grappler® attachment and containment grade polycarbonate operator shielding)

- Cylinder racks with protective structure

- ERC Emergency Cylinder Overpacks

- Metal detectors, shallow metal detector (White model 9400-DLMAX, or equivalent) and deep metal detector (Schonstedt Magnetic Locator Model CA-72 Cd, or equivalent)

- Real-time air monitoring equipment including photo-ionization detector, combustible gas indicator, oxygen meter, sulfur dioxide detector

- ERC Valve Sampling Station®

- ERC Cylinder Recovery Vessel®, (will be brought on-site if required)

- Mobile analytical equipment (MS and FTIR)

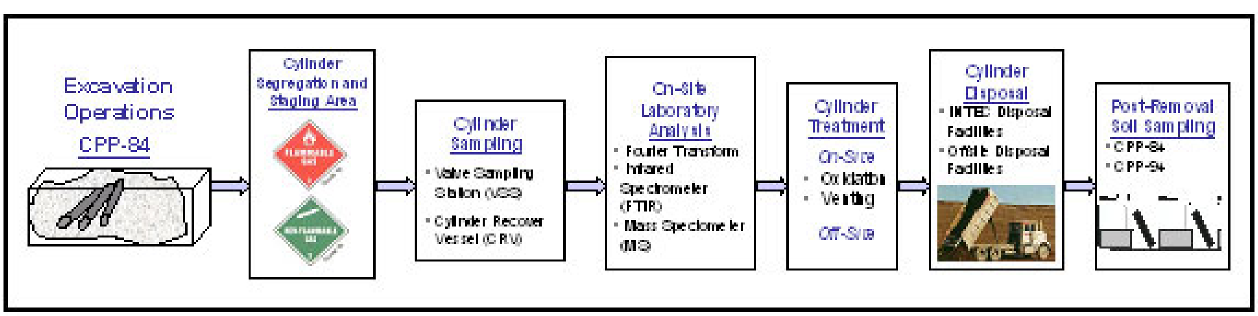

Figure 5-1. Description of remedial action.

- Communications equipment
- Cylinder handling dolly
- Personnel protection equipment
- Spill control equipment
- Miscellaneous hand and power tools
- Support vehicles
- Portable sanitary facilities.

The job site will be segregated into three work areas: EZ, contamination reduction zone (CRZ), and SZ. These zones are designed to provide site workers with safe and efficient work areas. Considerations include stockpiling of excavated soil, safe ingress and egress for equipment and personnel, sampling and laboratory operations areas, and segregated storage areas. Figure 5-2 provides a layout of the work site.

5.2 Excavation Operations

The excavation will be performed in a manner protective of worker safety and to minimize the potential for a release to the environment. Cylinders will be excavated by mechanical and hand-digging. Excavation activities will be photo-documented. During mechanical excavation, for protection against fragmentation from a catastrophic cylinder failure, workers will be protected by either containment-grade polycarbonate shielding or 1/4-in. steel plate. Mechanical excavation will be performed in 6-in. lifts and will not be performed within 6 in. of cylinders. Continuous magnetometer surveys, physical probing air monitoring, and radiological surveys will be performed to during the excavation process. Hand excavation will be performed within 6 in. of cylinders to expose the cylinders for mechanical lifting. Cylinders will be preliminarily identified visually and evaluated for stability according to CGA guidelines as expressed in pamphlets C-6 (CGA 1993), C-6.1 (CGA 1995b), C-6.3 (CGA 1999), and C-13 (CGA 2000a). The cylinders must be evaluated as safe for transfer before movement to the staging site. If the cylinders are classified as unstable they will be removed from the excavation by the cylinder grappling device designed specifically for that purpose. Figure 5-3 is a photograph of the grappling device. Identification of cylinders as unsafe for transfer will result in cessation of removal activities and re-evaluation of the hazards and excavation approach. At this time, the use of robotic excavation will be considered.

5.3 Cylinder Segregation and Staging

Cylinders will be segregated by compatibility type based on the preliminary cylinder classification. Flammability will be the segregation criteria. All cylinders that are determined by the initial inspection to contain nonflammable gases (nitrogen, oxygen, compressed air, and argon) will be segregated separately. Likewise all flammable gas cylinders (acetylene) will be staged together. The segregated groups will be staged a minimum of 30 ft apart (in accordance with CGA P-22 [CGA 1995a]) and will be situated away from the sampling and removal areas.

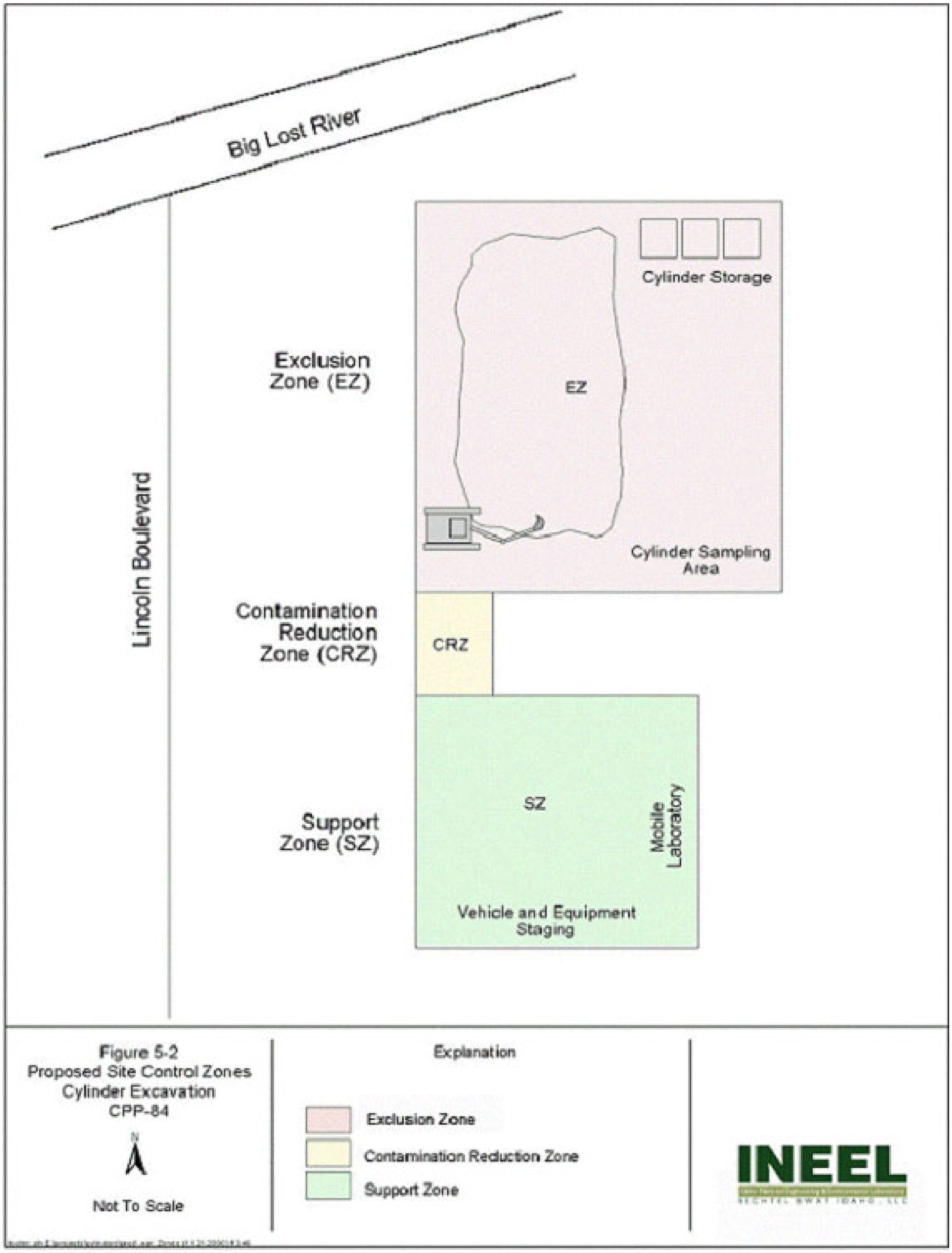

Figure 5-2. Proposed site layout.

Figure 5-3. Cylinder grappling device.

The cylinders will be staged using specially designed cylinder racks. During the removal activities, field personnel will periodically inspect the staged cylinders and monitor ambient conditions. After removal is complete, access to the staging area will be limited using construction fencing and the area will be posted. The cylinder racks will be fitted with tarpaulin to protect the cylinders from the weather. Figure 5-4 is a photograph of a typical cylinder rack.

5.4 Cylinder Sampling

Cylinder sampling techniques are based solely on cylinder and valve integrity. For cylinders with operable valves, a remotely operated system, the VSS, will be used. This system allows the operator to remotely view the sampling operation using video equipment. For cylinders that are in poor condition or with inoperable valves, the CRV will be used. The CRV is a remotely operated, pressure-rated vessel that is housed within in a secondary containment chamber for the containment of fugitive gases. The cylinder is pierced within the CRV, allowing the contents of the cylinder to be sampled and analyzed. Figure 5-5 provides a schematic of the VSS and Figure 5-6 provides a photograph of the CRV.

5.5 Onsite Laboratory Analysis

One of two methods, (1) FTIR or (2) MS, will be used to perform analysis of cylinder contents. The infrared spectrum contains characteristics that permit identification of functional groups, or “working parts” of molecules. Through the use of an interferometer, infrared wavelengths are passed through a sample simultaneously. A laser is used to align the optics used in the process.

Figure 5-4. Typical cylinder rack.

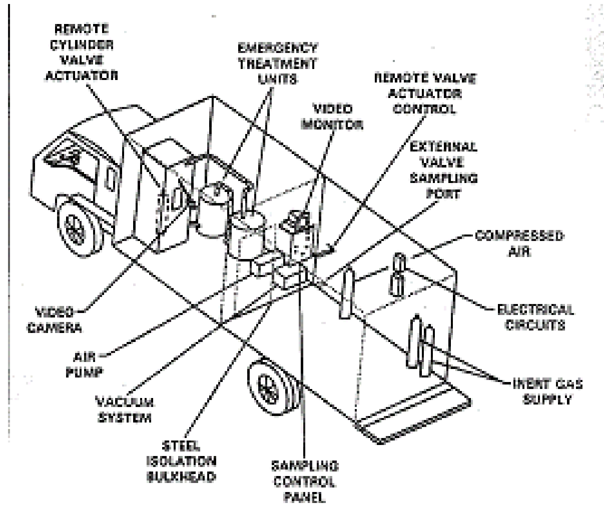

Figure 5-5. Schematic of the VSS.

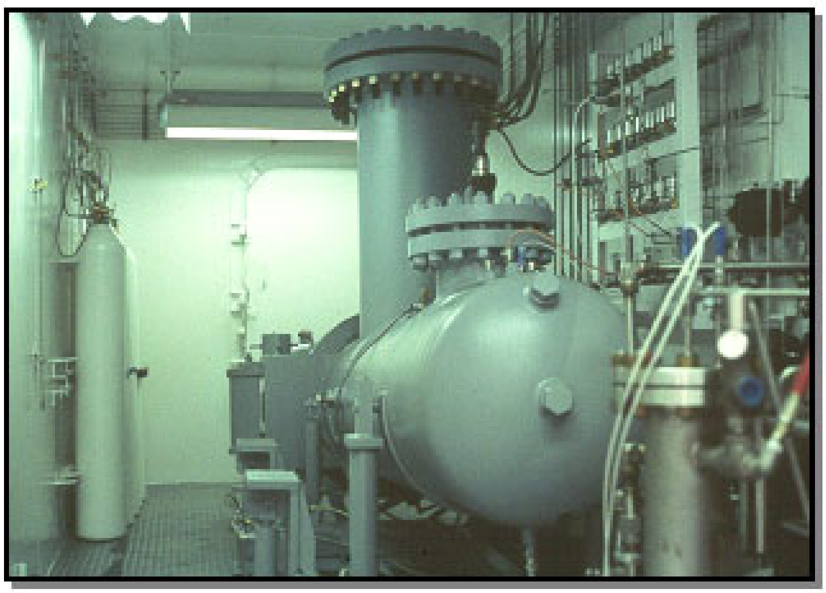

Figure 5-6. Photograph of CRV.

The FTIR will be used to qualitatively identify cylinder contents through a comparison of spectra with library references. Spectral libraries are maintained with the laboratory computer. Computer libraries are supplemented by several standard hard-copy references. The FTIR is applicable for all but elemental gases (oxygen, nitrogen, etc.). For elemental gases, MS is the preferred method of analysis.

The MS is a vacuum analyzer, which will measure total and partial pressures. The analyzer is a quadruple mass spectrometer that is capable of separating ions formed in an electron impact source according to the mass-to-charge ratio.

5.6 Cylinder Treatment

A majority of the cylinders removed from CPP-84 are expected to be treated by venting to the atmosphere. This treatment technique is appropriate for inert gases. These gases include nitrogen, oxygen, argon, helium, carbon dioxide, and compressed air. For flammable gases, such as acetylene, thermal oxidation (flaring) is the preferred treatment technique. Analysis will confirm whether the gases contained in the cylinders are common industrial gases typically associated with construction operations. Following laboratory confirmation of cylinder contents, the industrial gases will be disposed of by either controlled venting or flaring. If unexpected gases are identified cylinder overpacks may be used for off-Site shipment. Figure 5-7 shows a photograph of a typical cylinder overpack.

5.7 Cylinder Disposal

After cylinder treatment, disposal of the cylinder body is required. Disposal options are based on contents of the cylinder. Cylinders that contained inert gases (oxygen, nitrogen, compressed air, helium, argon, and carbon dioxide) will be rendered useless by drilling, cutting, and/or valve removal. Final disposition of these cylinders will be at the ICDF or the INEEL Landfill Complex.

Cylinders that contain acetylene present special waste management considerations. Acetylene cylinders are constructed with a porous filler (usually asbestos) and a solvent (acetone) to provide for safe handling and operation. After treatment, cylinders that contained acetylene will be transported off-Site for final disposition.

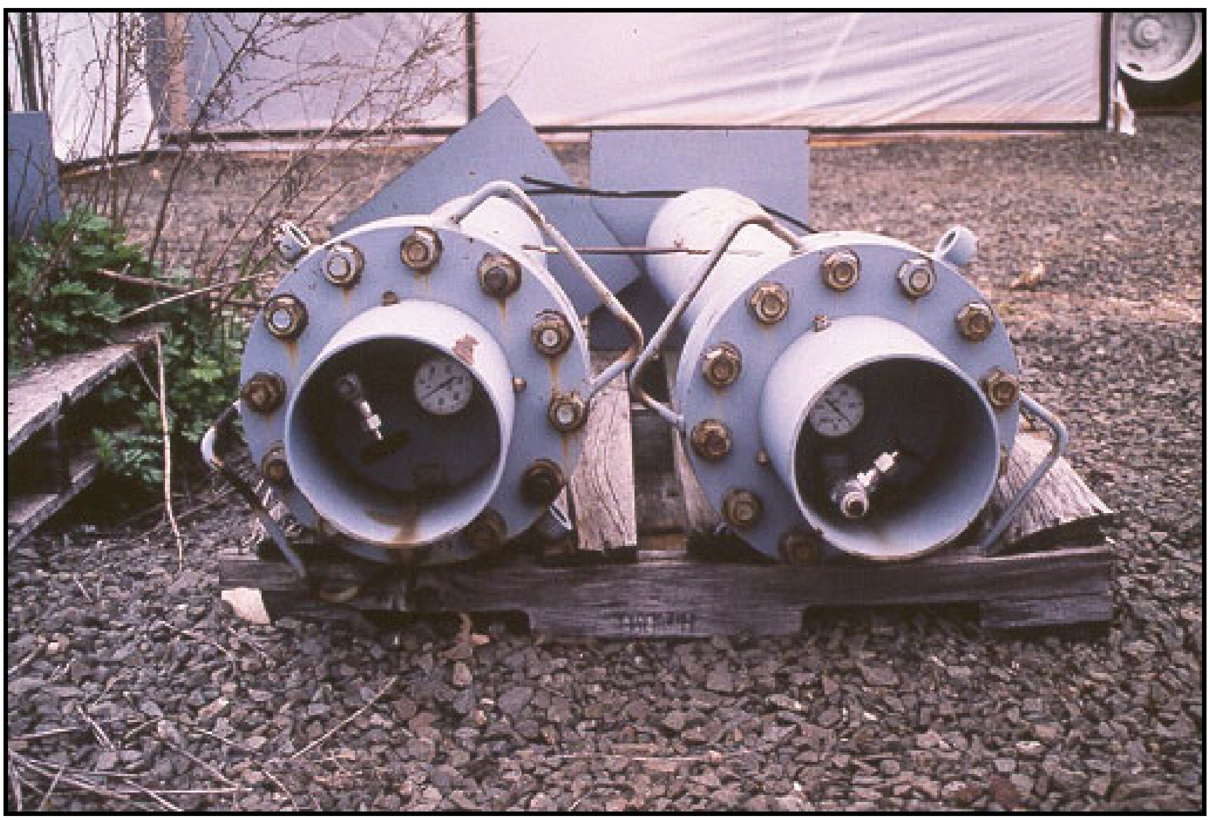

Figure 5-7. Typical cylinder overpack.

5.8 Post-Removal Sampling

Post-removal sampling activities at CPP-84 and CPP-94 consist of soil sampling to estimate the average concentrations of COPCs in the excavation, plus confirm the magnetic field survey. Based on the DQOs of this project, a simple random sampling design (utilizing composite samples) will be used for locating sampling locations. Samples will only be taken from grids where cylinders have been retrieved. Refer to Table 3-2 for details regarding the DQOs for post-removal characterization activities. Figure 5-8 provides a hypothetical grid layout with composite sampling locations for the post-removal sampling activities. **Note:** If visual evidence indicates the potential for soil contamination (e.g. obvious differences in soil color, moistness, or texture), biased (judgmental) samples will be collected to characterize the anomaly.

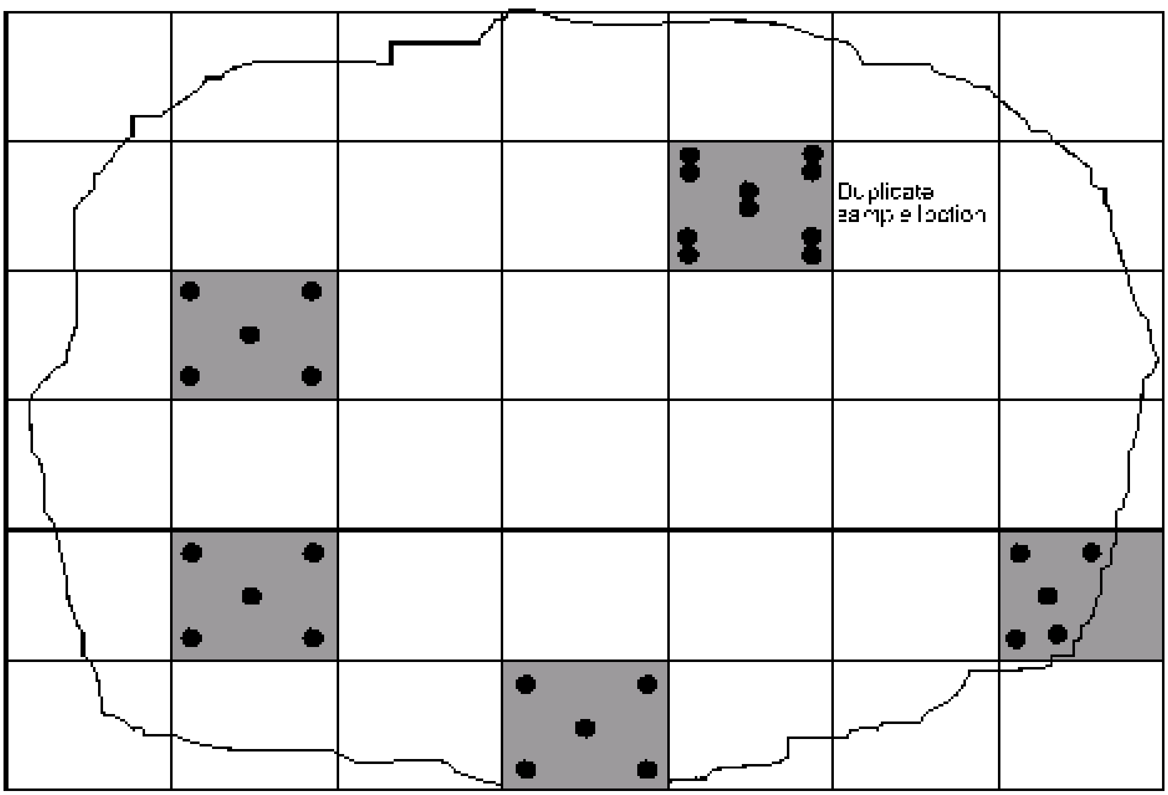

Figure 5-8. Hypothetical grid layout with composite sampling locations.

6. REMEDIAL ACTION WORK PLAN ELEMENTS

This section provides a description of the work plan elements required to complete the remedial action. Elements provided in this section include safety and emergency response analyses, planning documents, excavation/operational guidance, project cost estimates, and project schedules.

6.1 Relevant Changes to the RD/RA Statement of Work

The *OU-13 RD/RA Scope of Work* (SOW) (DOE-ID 2000) identifies the scope for Group 6, Buried Gas Cylinders. At the time the SOW was submitted, significant concerns were identified with regards to the safe removal of the cylinders. Since then, an Engineering Design File (INEEL 2000a) and a hazard classification (INEEL 2000b) were completed to better define the distribution of cylinders at each site and evaluate the potential hazards. The results of these studies defined the areas impacted by cylinder burial and determined the hazard classification CPP-84.

The relevant changes to the scope are three-fold:

1. The hazard classification is completed and activities at both sites have been designated as low hazard activities. Removal operations are considered to be safe given proper work practices and engineering controls as identified in an auditable safety analysis (ASA) or HASP. The HASP is provided in Attachment 2.

2. Since it has been determined that the removal of cylinders does not pose an unacceptable risk to workers, the remedy of capping the cylinders in place with an engineered barrier was not selected. The remedy of removal, characterization, and treatment is the preferred option since it best meets the seven evaluation criteria (overall protection of human health and the environment, compliance with ARARs, long-term effectiveness, reduction of toxicity, mobility, or volume, short term effectiveness, implementability, and cost).

3. The cylinders at CPP-94 have been removed. The remaining work at CPP-94 includes post-removal soil sampling, backfilling, and site grading.

6.2 Emergency Response Plan

The emergency response plan (ERP) defines the responsibilities of the project and the INEEL Emergency Response Organization by providing guidance for responding to abnormal events during project activity. This plan addresses OSHA emergency response as defined by 29 CFR 1910.120/1926.65 and DOE requirements a defined by DOE Order 151.1B. The ERP is provided in Section 11 of the project HASP (Attachment 2).

6.3 INEEL Environmental Documentation

An environmental evaluation (Savkranz 2000) has been conducted at the site. The results of the site evaluation indicate that each area has been previously disturbed by site operations and that the vegetation includes sagebrush, rabbit brush and a variety of native and introduced grasses. It is unlikely that the removal action will have impacts to species of federal or state concern. The environmental evaluation further determined that this project is unlikely to have an impact on cultural resources. A copy of this evaluation is available in the project files.

6.4 Hazard Classification/Auditable Safety Analysis and Unreviewed Safety Question Review

A hazard classification was completed based on the amount of releasable radioactive and hazardous materials. The remedial actions at both sites have been designated as low hazard activities (INEEL 2000b). A low hazard designation means the activity can only affect personnel in the immediate area. The safety documentation required for a low hazard activity is an ASA, which will identify all the hazards associated with the remediation activity. Since the remedial action is classified as a low hazard activity, the health and safety plan is equivalent to an ASA. A copy of the hazard classification is provided in Attachment 3 and the HASP is provided in Attachment 2.

6.5 Evaluation of Remedial Action Against Performance Measurement Points

The remedial action of removal, treatment, and disposal meets the RAO and RG as discussed in the ROD. Magnetometer surveys plus visual and physical observations will confirm the removal of cylinders. Soil sampling will also be completed to ensure that any potential residual concentrations have been removed. Since the removal of the cylinders will mitigate any potential future safety hazards, long-term monitoring at these sites will not be required. However, a prefinal and final inspection will be completed by the Agencies. (**Note:** It may be determined that the prefinal is the only inspection needed, if this is the case, a final inspection will not be conducted, and the prefinal will serve as the final inspection.) Compliance with the performance measuring points will be discussed in the remedial action (RA) report. The RAOs and RGs are discussed in Section 3 and the soil sampling is discussed in the *Preliminary Characterization Plan* (DOE-ID 2001a) provided in Attachment 1.

6.6 Field Oversight and Construction Management

The DOE-ID remediation project manager will be responsible for notifying the EPA and IDEQ of major project activities (e.g., project start-up or closeout) and other project activities it deems appropriate. DOE-ID will serve as the single interface point for all routine contact between the EPA, IDEQ, and BBWI.

BBWI is responsible for field oversight and construction management services for this project and will provide field support for health and safety, quality assurance, and landlord services. Visitors to the project who wish to observe remediation activities must meet badging and training requirements necessary to enter INEEL and INTEC facilities. Project-specific training requirements for visitors are described in the project HASP.

6.7 Project Cost Estimate

A summary of project costs is provided in Appendix A.

6.8 Project Schedule

The remedial action working schedule for Group 6 is presented in Appendix B and includes all project tasks from preparation of this *Work Plan* through performance of the remedial action and submittal of the closure report. Administrative and document preparation and field activities are based on a 40-hour workweek. This schedule assumes concurrent contractor and DOE-ID document reviews. There is no schedule contingency for delays in field activities impacted by adverse weather conditions.

The project schedule has been revised based on limited budget and pending time constraints. The excavation and treatment of the cylinders at CPP-84 has been postponed until FY-04. Table 6-1 shows the targeted activities associated with the Group 6 cylinder removal project.

Table 6-1. Summary of major Group 6 activities, future reports, and primary enforceable milestone.

Group 6 Activities	Type	Target Date	Enforceable Milestone
Perform prefinal inspection[a]	Other	10/01/04	NA

a. Final inspection date is determined in pre-final inspection report. Draft RA report is due 60 days following the final inspection.

6.9 Remedial Action Reporting

The remedial action process includes the preparation of at least one primary and one secondary document. The prefinal inspection report will be a secondary document that will include the following:

- Outstanding construction requirements
- Actions required to resolve items
- Completion date
- Date of final inspection.

The Agencies or their representatives will conduct the prefinal inspection. All comments will be finalized in the primary remedial action (RA) report. To the extent possible, RA reports for individual work elements will be consolidated into a single RA report. The RA report will be prepared at the completion of remedial action and will include the following:

- A brief description of outstanding items from the prefinal inspection report
- Synopsis of work defined in the *RA Work Plan* and certification that this work was performed
- Explanation of any modifications to the *RA Work Plan*
- Certification that the remedy is operational and functional
- Documentation necessary to support a notice of completion as discussed in Part XXV of the FFA/CO (DOE-ID 1991). The documentation will be sufficient to support that no further remedial action, including institutional controls, is required.

6.10 Health and Safety Plan

The project HASP was prepared specifically for the tasks and conditions expected during implementation and execution of this project. It is provided in Attachment 2 of this document. The HASP, which may be updated as site and project conditions dictate, includes the following elements:

- Task site(s) responsibilities

- Recordkeeping requirements
- Personnel training requirements
- Occupational medical program and medical surveillance
- Accident prevention program
- Site control and security
- Hazard assessment
- Personal protective equipment
- Decontamination procedures
- Emergency response plan.

6.11 Field Sampling Plan

The field sampling work for the buried gas cylinders is comprised of two distinct strategies:

- Soil sampling
- Cylinder sampling.

The soil sampling strategies and procedures are identified in the *Preliminary Characterization Plan for OU-3-13, Group 6, RD/RA Buried Gas Cylinder Sites: CPP-84 and CPP-94* (DOE-ID 2001a) (Attachment 1). The procedures and strategies for sampling cylinders are provided in Section 7.

6.12 Waste Management Plan

The *Waste Management Plan* (WMP) defines projected waste streams, volumes of projected waste, methods of characterization, storage and inspection requirements, and treatment and disposition options. The anticipated waste streams for the removal action are as follows:

- Inert gases (nitrogen, oxygen, argon, carbon dioxide, and compressed air)
- Flammable gases (acetylene)
- Empty, dismantled inert gas cylinders
- Empty acetylene cylinders
- PPE and miscellaneous noncontaminated waste
- Soil sampling wastes
- New waste streams.

The WMP for the Group 6 remedial action is provided in Attachment 4.

6.13 Data Management Plan

The principal objective of data management is to provide consistent and rapid access to accurate, validated data useful in the evaluation of remedial actions. The data management for the buried gas cylinders remedial action is supported by two data management strategies: (1) the management of data associated with the collection of soil data and (2) the management of data associated with removal and characterization of cylinders.

The Data Management Plan for Idaho National Engineering Laboratory Environmental Restoration Program (INEL 1995) will be used to guide the data management of the analytical results from soil sampling. Analytical results from soil samples will be to

- Ensure that uncorrupted field data are transferred to a permanent, long-term, easily accessed data storage system
- Track and organize all chemical and nonchemical data pertaining to field activities and sample collection
- Ensure that the description of each data point is meaningful and complete
- Ensure that large volumes of data can be efficiently managed
- Ensure that each data point is accurate and readily accessible.

The second data management strategy is focused on collecting and maintaining field and analytical data associated with the cylinders. These efforts are guided by the *Data Management Plan for Field and Nonchemical Data, OU 3-13, Group 6, Buried Gas Cylinders* (DOE-ID 2001b, Attachment 5 to this document). Data that will be managed under this plan are as follows:

- Excavation details
- Survey data
- Cylinder locations
- Cylinder classification
- Cylinder sampling
- Cylinder condition
- Magnetometer surveys
- Physical probing
- Staging and segregation areas.

Laboratory chemical analyses of soil samples will be arranged through INEEL Sample and Analysis Management (SAM). Data generated from these analyses are subject to the data management requirements imposed by the SAM.

6.14 Quality Assurance/Quality Control

Quality assurance and quality control requirements for all phases of this project will be controlled by two INEEL documents. First, Section 13 of the "Project Management Plan, Environmental Restoration Program Management" (PLN-694) describes the quality assurance systems used for all phases of this, and all Environmental Restoration projects.

Second, the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10 and Inactive Sites* (QAPjP) (DOE-ID 2002) provides minimum requirements for the following measurement quality indicators: precision, accuracy, representativeness, completeness, and comparability.

6.15 Decontamination

Large decontamination activities are not expected during this project. It is unlikely that soil contamination will exist and the decontamination of cylinder bodies is unlikely since toxic gases are not expected at CPP-84.

If soil contamination is encountered, exposed surfaces of equipment used for excavation and sampling will be decontaminated at designated decontamination areas in each work zone by brushing and wiping until all visible traces of soil and soil-related staining have been removed. If all the soil/staining cannot be removed by simple brushing and wiping, decontamination solutions (e.g., water) will be used. The management of decontamination fluids is addressed in the *Waste Management Plan* (Attachment 4).

6.16 Operations and Maintenance

An operations and maintenance plan is not required because the remedy is for complete removal of the hazard. The excavation will be filled with a suitable backfill material that will allow for compaction. The area will be evaluated for subsidence as part of the 5-year project review.

6.17 Spill Prevention/Response Plan

Any inadvertent spill or release of potentially hazardous materials (i.e. cylinder contents, equipment fluids) will be subject to the substantive requirements contained in the INEEL Emergency Plan/RCRA Contingency Plan manual (PLN-114-2).

Handling of the material and/or substance shall be in accordance with the recommendations of the applicable material safety data sheets, which will be located at the project site(s). In the event of a spill, the emergency response plan outlined in the project HASP will be activated. All materials/substances at the work site shall be stored in accordance with applicable regulations in approved containers.

6.18 Premobilization

Premobilization efforts involve all work elements that must be completed before the excavation equipment arrives on the site to start work. This includes such work as securing a contract for equipment, surveying the proposed excavation locations, marking proposed locations for underground utilities, approval of a work control package, personnel training, and approval of vendor data submittals. The final premobilization effort is a formal pre-job meeting at which the scope of work is discussed and HASP training is conducted. Any outstanding questions about the work to be performed are resolved at this meeting.

6.19 Mobilization

Mobilization of personnel and equipment to the site and initial preparation for operations will begin following the final work plan approval. Specialized equipment is required for site operations, including the following:

- Cat 320 or equivalent track-hoe excavator with containment grade polycarbonate operator shielding
- Case 580 or equivalent back-hoe with ERC Cylinder Grappler® attachment and containment grade polycarbonate operator shielding
- Cylinder racks with protective structure
- ERC emergency cylinder overpacks
- Shallow metal detector (White model 9400-DLMAX, or equivalent)
- Deep metal detector (Schonstedt Magnetic Locator Model CA-72 Cd, or equivalent)
- Real-time air monitoring equipment including photo-ionization detector, combustible gas indicator, oxygen meter, sulfur dioxide detector
- ERC Cylinder Recovery Vessel®
- ERC Valve Sampling Station®
- Mobile analytical equipment (MS and FTIR)
- Communications equipment
- Cylinder handling dolly
- Decontamination station
- Personnel protection equipment
- Spill control equipment
- Miscellaneous hand and power tools
- Support vehicles
- Portable sanitary facilities.

Temporary storage containers (International Organization for Standards [ISO] shipping boxes) will be established at the site for oxidizers, flammables, and other hazardous materials. These will be identified with appropriate National Fire Protection Association (NFPA) placards. An inventory will be maintained of the contents of each container in the site office.

A meteorological station will be set up prior to operations. This station monitors wind direction, speed, temperature and humidity.

After all equipment and facilities have been established onsite, task procedures will be demonstrated. The demonstration will cover all major-processing components. All procedures, including emergency response procedures, will be periodically implemented on a test basis. The results of these tests will be recorded in notes and field logs and will be incorporated into the final RA report.

6.20 Excavation Operations

The excavation operation requires setting up the work areas, including: (1) an EZ, (2) CRZ, and (3) a SZ. The work zones are identified in Figure 6-1.

Tasks included in the excavation operation include excavation of the historical cylinder burial pit; stockpiling excavated soils; providing safe ingress and egress for equipment and personnel; exposing and retrieving buried gas cylinders; performing an initial assessment of the cylinders; and placing the cylinders in a segregated storage area.

6.20.1 Objectives and Approach

The objectives of the excavation operations are to:

- Conduct all operations in a safe manner for all personnel and the public
- Conduct operations to minimize emissions
- Conduct operations with safe sloping requirements to comply with 29 CFR 1926
- Monitor the operations in a real-time mode for possible volatile or explosive atmospheres soils that may be used as backfill
- Monitor excavated soils so that possibly contaminated soils are segregated from clean
- Remove the buried cylinders from the excavation area
- Perform an initial identification and assessment of the cylinders to facilitate segregation and storage
- Store the cylinders in a segregated storage area.

The excavation approach will include surveys (visual and physical, radiological, volatile organic compound, and magnetometer) prior to and during the excavation. This will provide a real-time evaluation of hazards. The initial site activities will be to set up the work zones including the EZ, CRZ, and SZ. An excavation control grid will be established by which progress will be measured and documented. Figure 6-2 is a schematic on how the excavation will proceed and the theoretical survey spacing. The control grid will consist of 20-ft × 20-ft work areas with a 2-ft × 2-ft sub-grid for accurate documentation of surveys and cylinder locations.

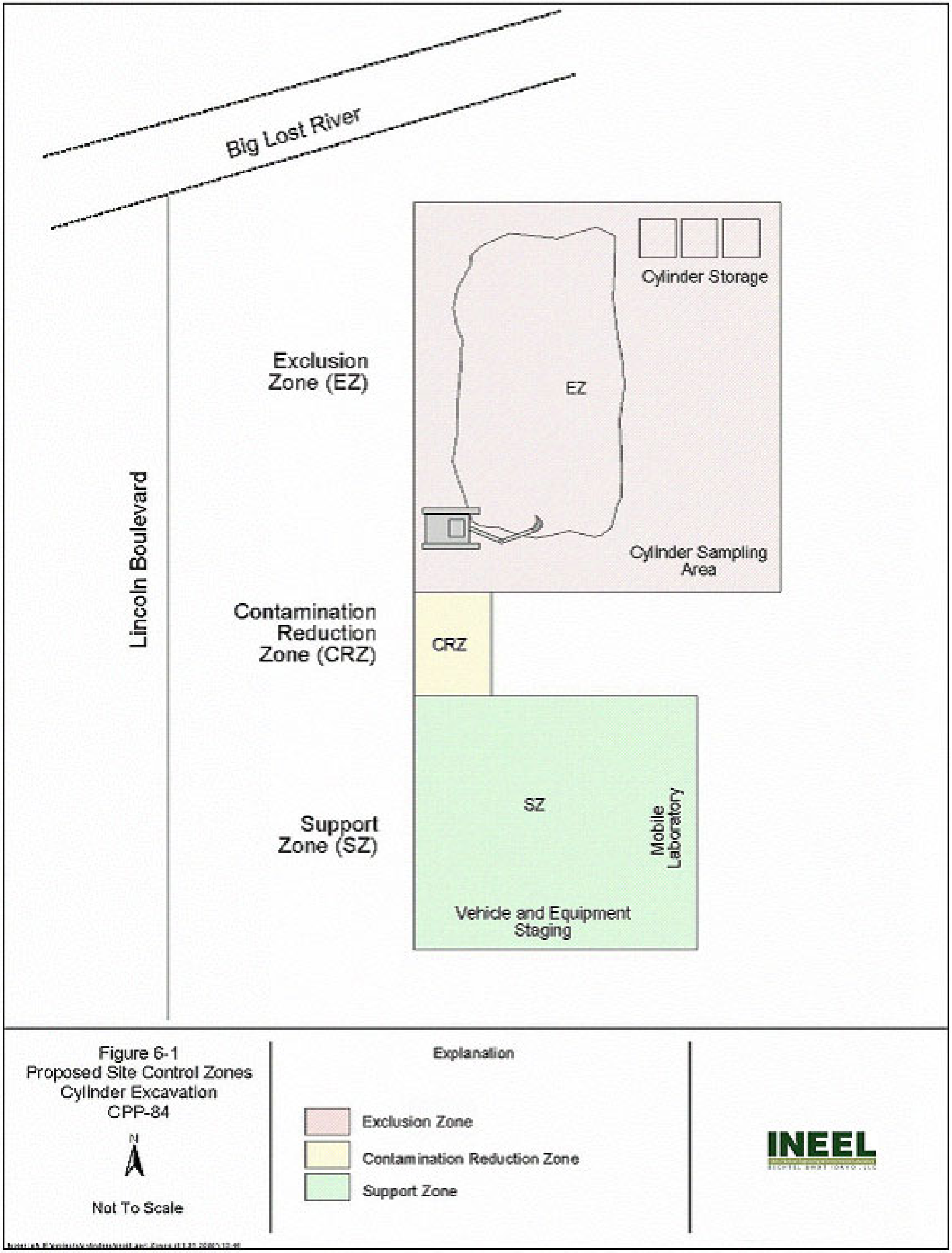

Figure 6-1. Proposed site layout.

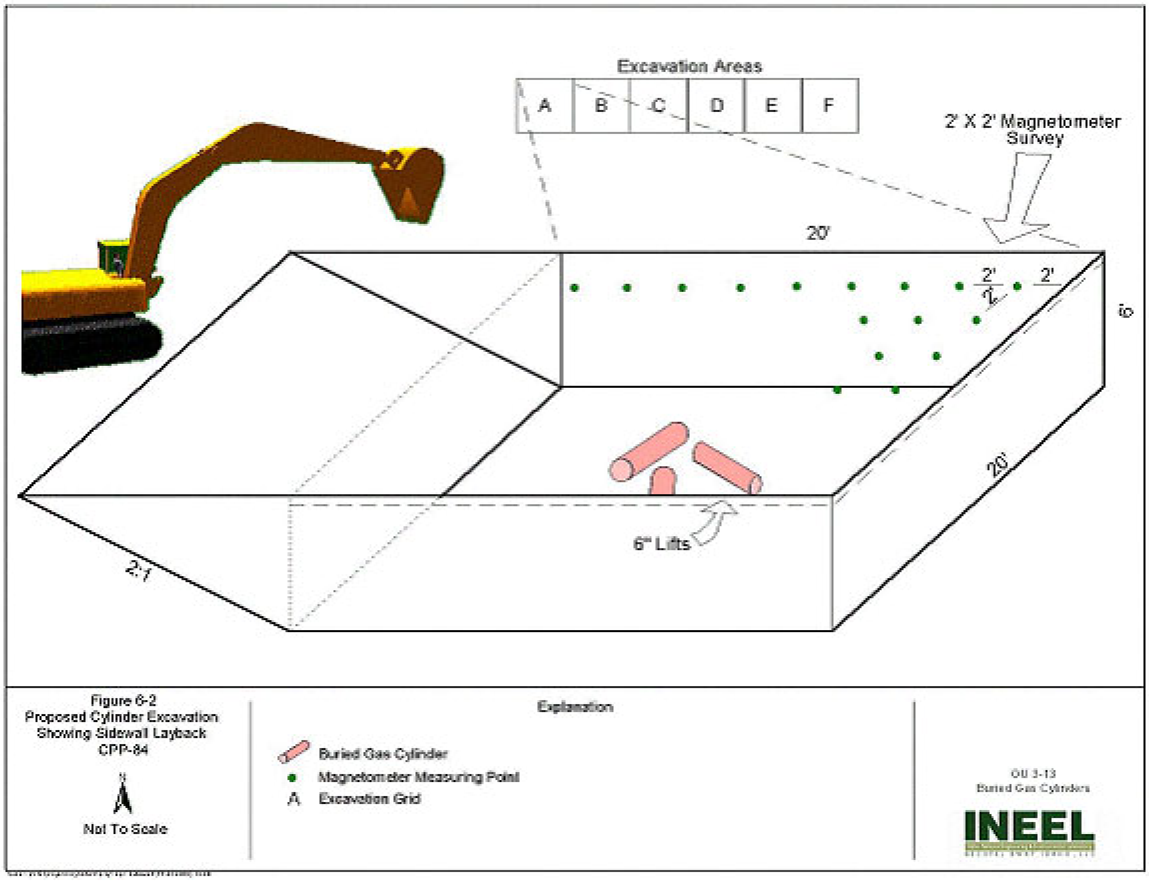

Figure 6-2. Schematic on excavation.

Work will take place sequentially in the control grid work areas starting in the southwest corner and working east then north. Figure 6-3 depicts the general excavation work flow. Shallow and deep magnetometer surveys and physical probing using a fiberglass soil probe will be used to identify buried cylinders. Mechanical excavation techniques using a track-hoe excavator fitted with a flat "toothless" bucket will be used for cylinders that are greater than 6-in. below surface or stacked laterally. Hand excavation techniques will be used to expose the cylinders. The excavation will be monitored for the presence of VOCs and explosive atmospheres periodically. Preliminary identification of the buried cylinders will be made as described in Sections 6.20.2.1 and 6.20.2.2 to confirm that they are "construction" gases (acetylene, argon, carbon dioxide, helium, nitrogen, and oxygen).

6.20.2 Safe to Operate Task

The Safe to Operate Task is intended to provide guidance for the monitoring of the excavations and the removal of cylinders from the excavation area to the storage area. These evaluations include magnetometer surveys, physical probing, physical inspections of the excavation, visual inspection of the cylinders, continuous measurement of VOCs in the atmosphere, continuous measurement of potential explosive atmospheres, and periodic radiological surveys. The Safe to Operate Task will be prior to the start of any site work and continuously throughout the performance of all other tasks. Figure 6-4 depicts the general Safe to Operate Task workflow.

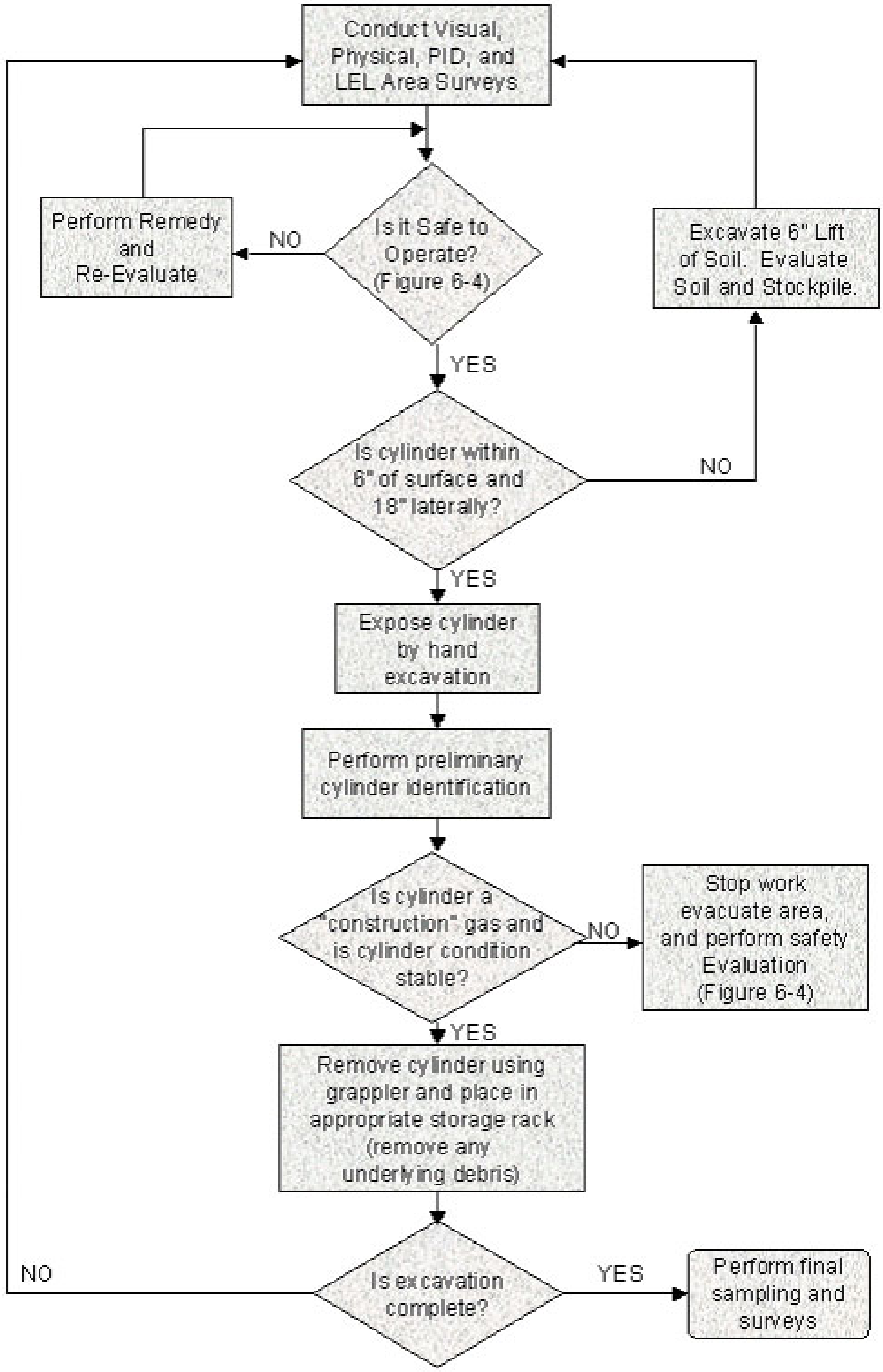

Figure 6-3. General excavation work flow.

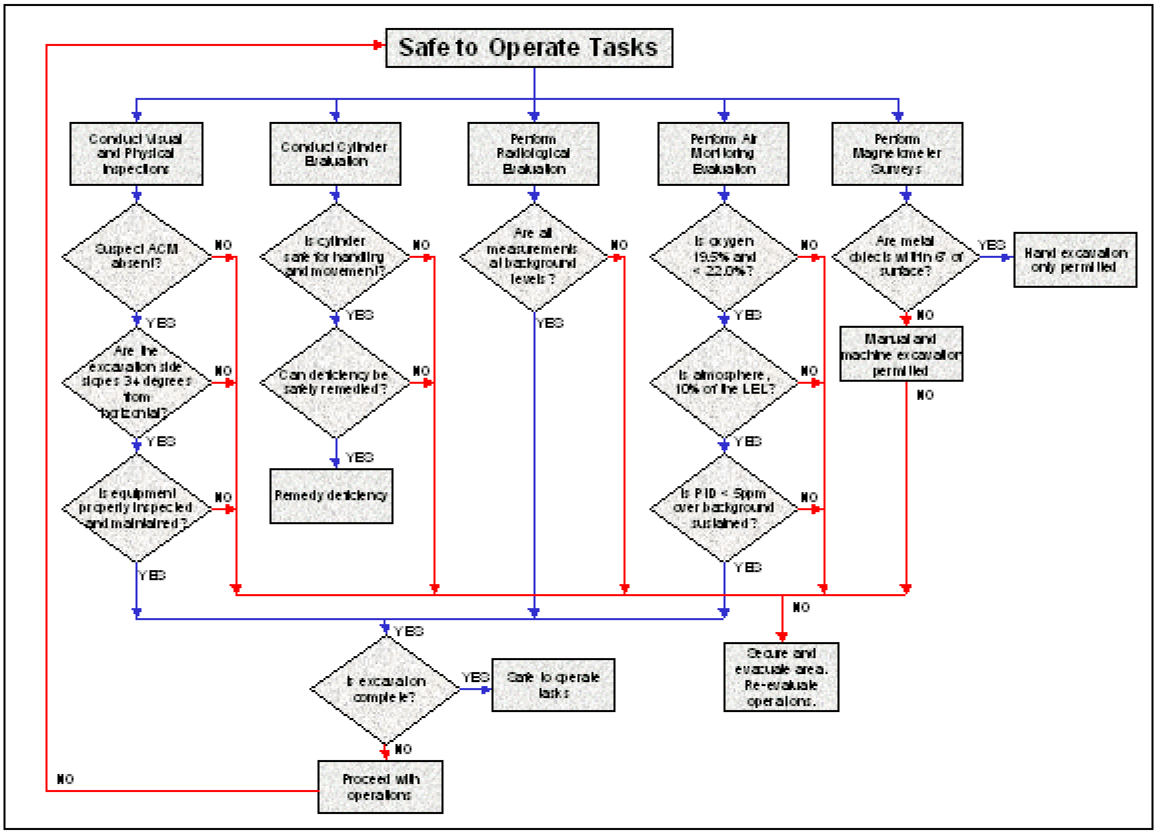

Figure 6-4. Safe to operate tasks.

6.20.2.1 Visual and Physical Evaluations. This section outlines the methods that will be used to evaluate the excavation site to ensure physically hazardous conditions are identified and corrected promptly. Visual evaluation of cylinders for identification and stability is covered in a separate section.

6.20.2.1.1 Responsibilities—The FTL or HSO (or designee) is responsible for ensuring that daily and on-going inspections are completed and documented, and for ensuring that work areas, equipment, vehicles, and safety barriers are in place and serviceable. They are also responsible for ensuring that corrective measures are implemented when hazardous conditions are discovered or reported.

Remediation technicians are responsible for identifying non-"construction" gas or unstable cylinders. They are also responsible for visual identification of suspect asbestos-containing materials from ruptured acetylene cylinders.

All personnel working in and around the excavation and cylinder storage areas are responsible for inspecting/monitoring work areas, vehicles, and equipment in their vicinity and under their control for compliance with general safety practices and serviceability. Each worker must immediately report unsafe conditions or unserviceable vehicles or equipment to their supervisor or site safety personnel.

6.20.2.1.2 Hazards Identification and Reduction—Work areas, vehicles, and equipment will be inspected/monitored daily for safe conditions and serviceability by the worker responsible. A daily "tailgate" health and safety briefing will be conducted by the HSO and will cover the specific hazards expected to be encountered that day as well as general health and safety practices.

The FTL or HSO will monitor all operations and conditions and stop operations if unsafe conditions are observed or reported. They will ensure that immediate corrective actions are taken to maintain a safe working environment.

Acetylene cylinders commonly contain asbestos as a stabilizer. Acetylene tanks are expected to be found and will present an asbestos hazard in the unlikely circumstance that the cylinders are ruptured during removal activities or are found in a breached state.

6.20.2.1.3 Equipment and Materials—

- Field logbooks/inspection forms
- First aid kit
- Fire extinguishers: (2) 4A-80B-C, (2) 3A-40B-C. Will be available and serviceable per 29 CFR 1926.50 and 29 CFR 1926.150
- Warning signs and safety barriers (construction fence, rope, barricades). Will be available and serviceable per 29 CFR 1910 and 29 CFR 1926
- Fragmentation protection (DSM Sheffield containment grade polycarbonate) screens for the excavator and remediation technicians
- Ground fault interrupter devices for generator for hand tools. Operated in accordance with 29 CFR 1926.300 and 29 CFR 1926.400.

6.20.2.1.4 Methods—Physical hazards will be identified through visual observations and through daily inspections throughout the work site.

Suspect asbestos containing materials will be identified through visual observations of the cylinders and soils by asbestos awareness trained personnel. Particular attention will be paid to damaged or ruptured cylinders and soils surrounding damaged or ruptured cylinders. If suspect asbestos containing materials are observed, work will cease and the exclusion zone will be evacuated. A re-evaluation of personal protective equipment (PPE) and remedial techniques will be performed.

Excavations will be inspected by the competent person to ensure proper side slopes per 29 CFR 1926.651.

All work areas, ingress, and egress routes will be maintained free of debris, holes, or slippery surfaces.

Dust will be controlled in all work areas by watering with a hand-held sprayer or water truck.

Safety barriers including construction fences, ropes, and signs will be used to control access to hazardous areas.

Vehicles and heavy equipment will be inspected daily for serviceability by the assigned operator. Operators will ensure proper operation and use of parking brakes, backup alarms, warning lights, and seat belts in accordance with 29 CFR 1926.550 and 29 CFR 1926.600. Lift ratings will be checked and safe working loads must not be exceeded.

6.20.2.2 Cylinder Evaluation.

6.20.2.2.1 Responsibilities—The FTL, HSO, or designee will be responsible for performing the cylinder evaluation and completing the required documentation. All personnel within the excavation area will be trained in cylinder identification and are responsible for observing their general area and reporting unsafe conditions.

6.20.2.2.2 Hazards Identification and Reduction—The primary hazard associated with the cylinder inspection is from gas leaking from the cylinders and causing asphyxiation, toxic exposures, explosions, and fires. These hazards are mitigated by the continuous air monitoring performed under the Air Monitoring Evaluation component of the Safe to Operate Task. Air monitoring of the cylinder valve area and in the vicinity of the cylinder will be performed prior to inspection.

6.20.2.2.3 Equipment and Materials—

- Valve protection devices
- 35mm camera
- Instant camera
- Spray paint and stencils
- Brush
- Metal cylinder tags w/ punch set for marking
- Cylinder log forms
- CGA P-1, Safe Handling of Compressed Gases in Containers (CGA 2000b)
- CGA C-6, Standards for Visual Inspection of Steel Compressed Gas Cylinders (CGA 1993)
- CGA C-6.1, Standards for Visual Inspection and Requalification of High Pressure Aluminum Compressed Gas Cylinders (CGA 1995b)
- CGA C-6.2, Guidelines for Visual Inspection and Requalification of Composite High Pressure Cylinders (CGA 1996)
- CGA C-6.3, Guidelines for Visual Inspection and Requalification of Low Pressure Aluminum Compressed Gas Cylinders (CGA 1999)
- CGA C-13, Guidelines for Periodic Visual Inspection and Requalification of Acetylene Cylinders (CGA 2000a)
- ANSI/CGA Standard V-9, Standard for Compressed Gas Cylinder Valves (ANSI/CGA 1991)

- CGA P-22, The Responsible Management and Disposition of Compressed Gases and Their Containers (CGA 1995a).

6.20.2.2.4 Methods—Cylinders will be individually inspected by the FTL, SSO, or designee. An evaluation of the cylinders will be performed to the maximum extent without removal of the cap or unnecessary handling of the cylinder. The inspection will compare cylinder external markings with the cylinder and valve type which will allow the correlation of the cylinder body with its internal contents. The inspector will also evaluate cylinder condition for stability during handling.

The inspector will approach the cylinder to be inspected but maintain adequate separation distance to avoid disturbing the cylinder. To the extent possible, without disturbing the cylinder, the personnel will complete the portions of the cylinder inspection log based on the visual examination. Pictures will be taken using the instant camera and 35mm camera. The instant photograph will be attached to the cylinder inspection log. Figure 6-5 provides an example of the cylinder inspection log.

Categorization of the cylinders for sampling technique is largely a matter of judgment based on the likelihood of valve operation and cylinder integrity. The cylinder must be safe for transportation to the temporary cylinder storage area. The inspector will make a determination on whether each cylinder is safe for handling and movement.

General criteria for safe handling includes the following:

- Extent of corrosion (i.e., percent of cylinder affected and criticality of affected areas)

- General appearance of valve as seen through cap (i.e., corrosion of valve or other damage)

- Type of cylinder valve

- Preliminary identification of contents through markings, color, and shape.

The CGA Handbook of Compressed Gases CGA, P-22, provides external inspection parameters. After the cylinder inspection for stability has been completed, the cylinder will be labeled and staged. Field personnel will record information concerning each cylinder on a cylinder inspection log. The log form includes the following:

1. Project Name. A unique project identifier will be assigned for each site. The unique identifiers for this project will be CPP-84 – Construction Gas Cylinder Landfill.

2. Cylinder Number. A unique identification number will be assigned for each cylinder. The numbering system will include the site (CPP-84) and a three digit sequential number (CPP-84-XXX).

3. Cylinder Grid Location. The work grid location (i.e., A1) from which the cylinder was excavated.

4. Date. The date of the cylinder inspection.

5. Inspector. The name and company of the individual completing the inspection.

6. Cylinder Serial Number. If available and legible, the serial number stamped on the shoulder of the cylinder.

Form 2
CYLINDER INSPECTION LOG

Project Name: ______________________ ERC #: ______________

Date: ______ Inspector: ______________________

Cylinder Serial #: ______________ Dimensions: ______________

Color: ______________________ Owner Stamp: ______________

DOT Rating: 3E1800 312015 3AA2400 3A2215

Other: ______________________ Test Date(s): ______________

Cylinder Type: H.P. ________ L.P. ________ Valve Type: ______________

Labels and/or Markings:

____

General Condition: Good Fair Poor

Comments: ______________________

Valve Condition: Good Fair ____ Poor ________

Comments: ______________________

Pre-operation Weight: ______ Post-operation Weight:

Approved to Handle: Yes ____________ No ____________

Handling Precautions: ____

Approved for Valve Sampling: Yes ____________ No ______

Sample Method: Large CRV ________ Small CRV ____ Val

Comments: ______________________

Sample Date: ______________ Pressure: ______________

Identified Contents: ____

Analytical Method: Mass Spec ________ FTIR ________ Other ________

Disposition: Caustic Scrub ________ Acid Scrub ________ Oxidizing Carbon ________

Mole Sieve ________ Flare ________

Recontainerized: Yes ____________ No ____________

Recontainerized Cylinder #: ______________________

"Use or disclosure of data contained on this sheet is subject to the restrictions on the title page of this plan."

ERC

Figure 6-5. Cylinder inspection log.

7. Dimensions. The approximate length and diameter of the cylinder.

8. Color. Any visible coloration of the shell or cylinder cap.

9. Owner Stamp. Any stamping on the cylinder shell indicating ownership.

10. ICC/DOT Rating. The specification and pressure rating of the cylinder based on stampings, if available and legible. Common cylinder types are listed on the form and may be circled as appropriate.

11. Test Date(s). Any stamped markings indicating test dates on the cylinder, if available and legible.

12. Cylinder Type. The cylinder type (high pressure or low pressure). In general, welded cylinders are considered to be low pressure and spun cylinders are considered to be high pressure. Cylinder types are illustrated in the cylinder reference documents.

13. General Cylinder Condition. A visual examination of the exterior of the cylinder will be recorded. The inspection will follow the guidelines established in the applicable cylinder reference documents for the cylinder type. Exterior defects such as corrosion, pitting, denting, bulging, or dings will be noted. A semi-quantitative measurement of the magnitude of defects will be recorded.

14. Cylinder Cap. The presence or absence of a cylinder cap will be noted. Any comments related to its appearance and potential removal problems will be noted.

15. Valve Type. If the cylinder valve is visible, the type of valve will be noted. The notation may be general (e.g. actuation mechanism, outlet type, diaphragm, packed) or, if known, the specific CGA identification (e.g., CGA 330). The presence of a plug or outlet cap should be noted. Figure 6-6 shows examples of several valve configurations.

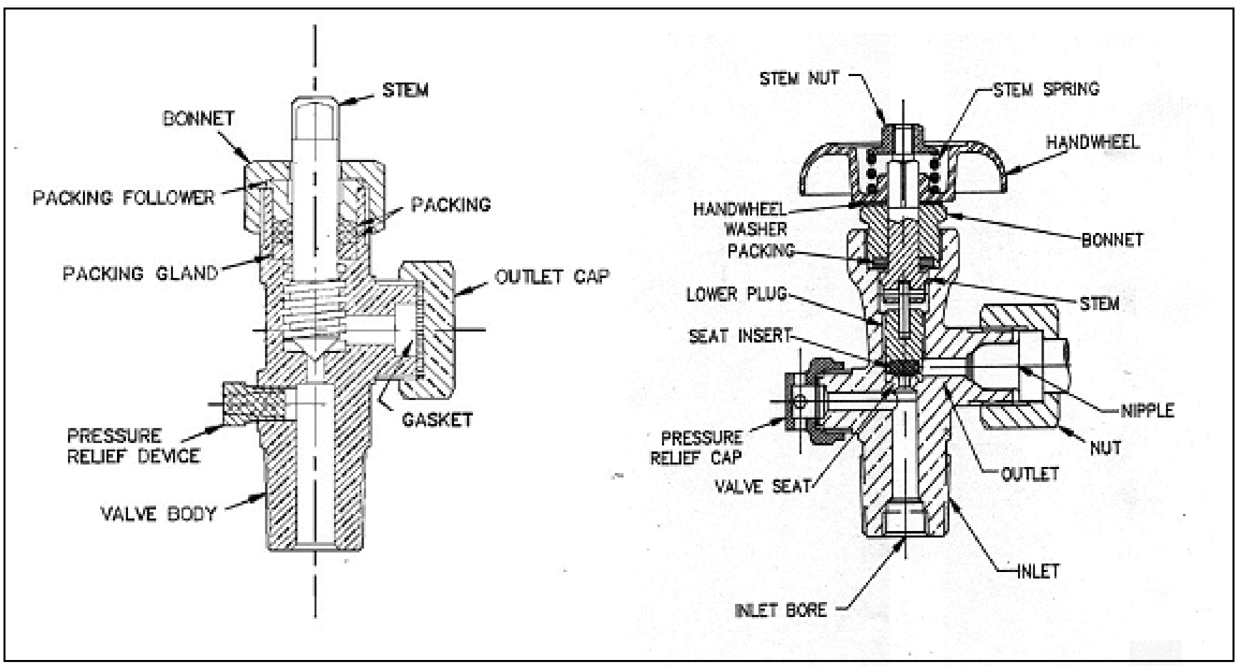

Figure 6-6. Examples of several valve configurations.

16. Pressure Relief Device. The type and location of any pressure relief device will be noted.

17. Labels and/or Markings. Any information present on the cylinder should be listed. Of particular importance is any labeling concerning contents or hazards.

18. Approved to Handle. Field personnel will review the information obtained and make a determination if the cylinder is safe to handle. The field personnel will initial the determination. If the cylinder is deemed unsafe to handle, handling is prohibited until adequate precautions are developed and a re-determination of safe to handle is made.

19. Approved for Valve Sampling. The field personnel will review the information obtained and make a determination if the cylinder is suitable for valve sampling techniques. The field personnel will initial the determination.

20. Sampling Method Utilized. The method used to sample the cylinder will be recorded the conclusion of the process (VSS or CRV).

21. Laboratory and Process Information. A shaded section of the form is reserved for recording laboratory and processing information. It will be completed by the laboratory technician after verification sampling.

22. Analysis and Processing Comments. This area is provided for recording any observations associated with the analysis or processing of the cylinder.

23. Sample Date. The date the cylinder is sampled.

24. Pressure. The cylinder pressure observed during the sampling process.

25. Identified Contents. Results of the laboratory analysis listed by IUPAC chemical name. The field personnel will initial the identification determination.

26. Analytical Method. Analytical methods used to determine the contents.

27. Disposition of Contents. The final disposition of the cylinder contents.

28. Disposition of Body. The final disposition of the cylinder body.

29. Recontainerized Cylinder Number. If applicable, the designated cylinder number containing the re-containerized contents will be listed by both the receiver project cylinder number and the receiver cylinder serial number.

A cylinder identification number will also be assigned and the cylinder will be labeled using spray paint and stencils, and by affixing a metal tag on the valve neck. The numbering system will include the site (CPP-84) and a three-digit sequential number (CPP-84-XXX). The cylinders will also be marked with the work grid location. The cylinders will be photographed and their location and depth recorded.

After the inspection, the cylinder will be classified. This classification will be used to determine the handling, transportation and sampling requirements for each cylinder. The cylinder classifications are defined below:

Unrestricted Cylinders - Cylinders classified as "Unrestricted" are in good condition and suitable for routine handling and transportation. They will be DOT-rated containers (with valve protection), which are appropriately labeled. The contents are certified by the user and this forms the basis for subsequent handling. None of the cylinders from the excavation are expected to fall into this classification.

Restricted Cylinders - The "Restricted" classification will apply to the cylinders that meet CGA visual inspection criteria for filling and have external markings or features indicative of stable contents. The main difference between this classification and the "Unrestrictive" classification is the certainty of knowledge as to cylinder contents. None of the cylinders from the excavation are expected to fall into this classification.

Defective Cylinders - The "Defective" classification will apply to cylinders that do not meet CGA visual inspection criteria for refilling but appear to be structurally stable. These cylinders would be rejected for filling based upon external corrosion, dents, unauthorized or improper repair, or other observable defects such as fire damage or arc burns. Cylinders whose contents are unknown will also be classified as "defective". All or most of the cylinders are expected to fall into this classification.

Unstable Cylinders - "Unstable" cylinders are those that are in such poor condition that they may be unsafe to handle using typical techniques. This may result from extreme corrosion, damage to the cylinder shell, valve integrity, or unstable contents (i.e., unstabilized hydrogen cyanide). Upon identification of any cylinder in this type of condition the inspector will isolate the area by flagging. No further work will be completed in the area of such cylinders without providing for protection of others who may be working in the vicinity. Unstable cylinders may require special handling procedures (remote handling) or special transportation provisions (i.e., using a pressure vessel as an overpack). Unstable cylinders will violate "Safe to Operate" conditions and the excavation will be evacuated pending re-evaluation of work practices.

After classification of the cylinder as either unrestricted, restricted, or defective, personnel will prepare the cylinder for movement under direction of the FTL or SSO. The objective is to prepare the cylinder for routine handling. In the case where no valve protection is present, it will be necessary to provide protection for the cylinder valve. This will be done using valve caps or covers, or application of other protective structures. "Unrestricted" or "Restricted" cylinders will be loaded into cylinder racks for storage.

6.20.2.3 Radiological Evaluation. This section describes the methods and actions that are part of the Safe to Operate Task to detect radiological hazards. This section outlines methods to be employed by INEEL RCTs to identify radiological contamination in the Construction Gas Cylinder Landfill, CPP-84. Because radiological items were not identified as historically used at CPP-84 and no radiological contamination was identified in previous sampling, radiological contamination is not expected. Consequently, full-time radiological evaluation is not planned. RCTs will perform an initial survey of the site, periodic inspections during site work, and a final site survey.

6.20.2.3.1 Responsibilities—The assigned RCT is responsible for performing radiological contamination surveys and for ensuring that personnel comply with the appropriate radiological requirements and controls. Soil surveys will be performed through various phases of excavating. Periodic surveys will be performed on excavation soil, samples, equipment, cylinders, personnel, and other items at the project site. Final surveys will be conducted when fieldwork is completed. The ER HSO has overall responsibility for radiological monitoring.

6.20.2.3.2 Hazards Identification and Reduction—Radiological contamination hazards include gamma and beta radiations. The greatest potential for radiological contamination will be from the soil in the burial trench. Contamination in soil is of particular concern due to its mobility;

equipment, personnel, wind, rain, and other mechanisms can result in the spread of radiological contamination.

If contamination is detected, work will immediately cease. Further characterization and implementation of radiological controls will be conducted on a case-by-case basis.

6.20.2.3.3 Equipment and Materials—

- Bicron/NE Electra (DP-6or AP-5 probe) or equivalent
- Eberline RM-25 (HP-380AB or HP-380A probe) or equivalent
- Grab Sampler – SAIC H-810 or equivalent
- Massilin cloth
- Smears
- Sample jars.

6.20.2.3.4 Methods—Soils at varying depths and locations within the excavation will be surveyed throughout the development of the excavation. All excavation equipment, tools, and personnel will be periodically monitored. Cylinders will also be surveyed. Samples, cylinders, and other items sent offsite will be surveyed for unrestricted release.

Final surveys on all equipment, and materials will be conducted when fieldwork is complete. This includes excavation equipment, tools, and specialized equipment such as the VSS and CRV.

Monitoring will be performed in accordance with INEEL procedures. Any contamination that is detected will be managed on a case-by-case basis as directed by the RCT.

6.20.2.4 Air Monitoring Evaluation. This section describes the methods and actions that are part of the Safe to Operate task to detect airborne contamination and hazards during excavation of the construction cylinder landfill, CPP-84. The possible sources of airborne hazards are acetone in acetylene cylinders, the flammable gases acetylene and propane. The acetone is present in acetylene cylinders as a stabilizing agent and will present a hazard only if the cylinder is damaged or ruptured. In addition to monitoring for acetone, oxygen, explosive atmospheres, and acetylene, monitoring will be conducted to identify unknown sources of contamination and exposure.

6.20.2.4.1 Responsibilities—The HSO will use field instruments to conduct area surveys and will collect grab samples for head space analysis.

The site personnel will ensure that required surveys are performed and documented.

All personnel working in and around the excavation and cylinder storage areas area are responsible for immediately reporting odors or soil staining to their supervisor or site safety personnel.

6.20.2.4.2 Hazards Identification and Reduction—Any stained or discolored soils that are encountered during the excavation will be surveyed with the monitoring equipment. The soils will be monitored by area surveys and a grab sample taken in a plastic bag. The sample will be sealed and the soil agitated and warmed with a headspace reading taken.

Damaged or ruptured cylinders are to be considered a VOC hazard until surveyed. Damaged or ruptured cylinders will be surveyed by taking field instrument readings directly outside the rupture or damage. If a cylinder ruptures that contains dense gases, displacement of oxygen at the bottom of the excavation could occur. In this event, work will immediately cease, personnel will evacuate the area, and trained personnel wearing appropriate levels of PPE will conduct sampling of the area. Work will not resume until conditions are deemed safe.

Continuous area surveys of the excavation with field instrumentation will identify dangerous site conditions and help identify contaminated soils.

6.20.2.4.3 Equipment and Materials—

- Photo ionization detector (PID) with a 10.2 Ev Lamp
- Tri-Gas Meter with lower explosive limit (LEL) detector, percentage oxygen sensor, and sulfur dioxide (SO_2) sensor.
- Ziploc® type plastic bags
- Field logbooks
- Field sample log form
- Calibration gas and regulator
- Calibration log form.

6.20.2.4.4 Methods—PID and Tri-Gas Meter area surveys will be conducted prior to any site work and on an ongoing basis. The site health and safety officer will survey the excavation work area, cylinder storage area, and worker breathing zone areas documenting the results. The safety action level of PID measurement is any sustained reading of 5 ppm above background. The safety action level for LEL detector is 2%, the LEL for acetylene. The safety action level for oxygen is < 19.5% or > 22%. The SO_2 sensor will be used to identify acetylene build up in the excavation. Per the manufacturer of the Tri-Gas Meter and SO_2 sensor, acetylene will read on a 1 to 1 basis on the SO_2 sensor. The action level will be any sustained reading 5 ppm above background.

PID headspace tests will be taken of any stained or discolored soils that are encountered during the excavation and approximately every 10 yd of excavated soil. An approximately 25-g grab sample of the soils will be collected directly into a plastic Ziploc® bag. The sample will be sealed and the soil agitated for approximately 10 s. A headspace reading with then be taken by inserting the PID intake tube into the bag with care taken not to introduce soil into the intake. The sample reading and location will be recorded.

The PID and Tri-Gas Meter will be calibrated daily and the calibration documented.

6.20.2.5 Magnetometer Surveys. This section describes the methods and actions that are part of the Safe to Operate task to detect buried gas cylinders by their magnetic signature during excavation of the construction cylinder landfill, CPP-84. The magnetometer surveys will locate compressed gas cylinders on or near the surface of the excavation area. These surveys will be ongoing throughout the excavation process.

6.20.2.5.1 Responsibilities—Field personnel will perform the magnetic surveys with guidance and direction from the HSO and FTL.

6.20.2.5.2 Hazards Identification and Reduction—Magnetic surveys will be conducted prior to any digging operations. After each 6 in. excavator lift, a magnetometer survey will be performed. The surveys will be performed throughout the excavation work area. All contacts will be marked with nonmetallic pin flags or nontoxic spray paint. All contacts with metal will be considered as buried cylinders until proven otherwise. Items contacted close the surface will be carefully excavated by hand until exposed for inspection and identification as discussed in Section 6.20.2.2.

6.20.2.5.3 Equipment and Materials—

- Shallow metal detector (White model 9400-DLMAX, or equivalent)
- Deep metal detector (Schonstedt Magnetic Locator Model CA-72 Cd, or equivalent)
- Nonmetallic pin flags
- Nontoxic spray paint
- Survey tape
- Field logbooks
- Previous geophysical survey maps.

6.20.2.5.4 Methods—An initial survey of the entire cylinder landfill area will be performed using the shallow magnetometer following the grid pattern to ensure no areas are missed. The shallow magnetometer will locate contacts within approximately 6 in. of the surface. Contacts will be marked by an orange nonmetallic pin flag or nontoxic spray paint. A second survey of the area will be performed using the deep magnetometer following the grid pattern to ensure no areas are missed. The deep magnetometer will locate contacts within approximately 48 in. of the surface. Contacts will be marked by a green nonmetallic pin flag or nontoxic spray paint. The results will be recorded on a separate map in a manner similar to the shallow survey.

Ongoing surveys, both shallow and deep, will be performed during all excavation operations. All areas will be surveyed prior to digging. All areas will be resurveyed after a 6 in. lift is excavated.

If contacts are believed to be close to the surface (within 6 in.), they will be exposed by hand excavation for inspection and identification. If contacts are believed to be deeper than 6 in., mechanical excavation will proceed in 6-in. lifts.

6.20.3 Site Setup Task

6.20.3.1 Excavation and Cylinder Storage Area Setup.

6.20.3.1.1 Responsibilities—The FTL will direct the activities of the remediation technicians.

6.20.3.1.2 Hazards Identification and Reduction—General construction work hazards apply to this task. Safe to operate evaluations will be performed prior to and during the task performance.

6.20.3.1.3 Equipment and Materials—

- Orange construction fencing and T-posts
- Yellow polyethylene rope
- Warning signage
- Cylinder racks with protective structures.

6.20.3.1.4 Methods—The excavation area will be laid out based on existing information including past geophysical surveys and anecdotal information. Plant personnel will clear the area for buried utilities. An Idaho Registered Land Surveyor will survey in the past geophysical survey and an initial magnetometer survey will be performed to confirm the layout area. Anomalies will be marked with nonmetallic pin flags or nontoxic spray paint. The excavation area is expected be 20 ft × 100 ft.

An EZ will be established around the excavation area with a 100-ft buffer to allow for unimpeded movement during excavation activities. The EZ will be delineated by orange construction fencing with signs will be placed on each side indicating the following:

1. Exclusion Zone
2. Danger – Remediation Area
3. Authorized Personnel Only
4. PPE Required.

The excavation will be subdivided into a 20-ft by 20-ft working area grid with 2-ft by 2-ft subdivision for documentation purposes. The working grid will identified north-south by alphabetic characters and the east-west by numbers (i.e., A1, D10, etc.).

A personnel entrance and equipment entrances will be established leading from the EZ to the CRZ and to the cylinder storage and sampling area which is also an EZ. The CRZ will be demarcated using orange construction fence and will lead to the SZ. The SZ will be demarcated by orange traffic cones and will contain equipment and tool storage areas, and personnel break areas.

The cylinders will be temporarily stored in a designated storage area. This area will be an EZ and will demarcate by orange fencing and signs in the same manner as the EZ above. Cylinders will be segregated into two categories, flammable and nonflammable, and staged in separate cylinder storage racks separated by at least 50 ft. Cylinders will be stored in a cylinder storage rack. Each cylinder rack will be situated at least 30 ft apart and clearly marked flammable or nonflammable (CGA P-22 [CGA 1995a]). The racks will be anchored to the ground with steel rebar and have straps to secure the cylinders.

6.20.4 Excavation Task

Excavation methods to be employed include mechanical and hand techniques. Use of robotic excavation will be considered if toxic gas or unstable cylinders are found.

6.20.4.1 Mechanical Excavation. Mechanical excavation will be used for efficient removal of soils a safe distance from buried cylinders. Mechanical excavation will be performed using a track-mounted excavator with a flat "toothless" bucket.

6.20.4.1.1 Responsibilities—The FTL will direct the equipment operators and ensure they communicate as needed with the remediation technicians, and HSO.

Designated equipment operators will be the only personnel authorized to operate equipment. The equipment operator will be familiar with the safety features and operation of the equipment to which they are assigned.

6.20.4.1.2 Hazards Identification and Reduction—Special hazards are associated with the heavy equipment used in mechanical excavation. These hazards and their mitigation steps are as follows:

- **Traffic** – These hazards include injury to personnel and damage to equipment due to collisions. Equipment operators will use spotters when backing. All personnel will maintain eye contact with equipment operators when moving around equipment.

- **Crushing and impact hazards** – These hazards include injury to personnel from being caught between the body and tracks of the excavator and personnel being hit by a swinging excavator bucket. These hazards will be minimized by limiting personnel access to areas within the "swing" area of the excavator bucket. Personnel will enter the "swing" area only after making eye contact with the operator. The equipment operator will not operate the equipment while personnel are within "swing" range.

- **Excavation stability** – The excavation will be sloped a minimum of 1.5-ft horizontally to 1-ft vertically (34 degrees from horizontal) in accordance with the INEEL procedures.

- **Damage to and rupture of buried compressed gas cylinders** – These hazards include damage to buried cylinders by crushing from equipment on top of buried cylinders and damage to cylinders from excavator bucket during mechanical excavation. The excavation equipment will not be driven over, or placed on top of, buried gas cylinders. The areas identified as containing buried cylinders identified by magnetometer surveys will be clearly marked with pin flags and nontoxic spray paint. Equipment operators will be briefed on the location of buried gas cylinders during each tailgate health and safety meeting. The continuous magnetometer surveys will minimize the possibility of the excavator bucket contacting cylinders causing a rupture. The excavator bucket will be "toothless" to minimize the damage to a cylinder caused by errant contact.

6.20.4.1.3 Equipment and Materials—

- Cat 320 or equivalent track-hoe excavator with containment grade polycarbonate operator shielding
- Case 580 or equivalent back-hoe with ERC Cylinder Grappler® attachment and containment grade polycarbonate operator shielding
- Containment grade polycarbonate mobile barricades (48 in. × 60 in.)
- Fiberglass soil probe.

6.20.4.1.4 Methods—Excavation work will be performed in one 20-ft × 20-ft work area at a time. Soils will be excavated from the work area in 6-in. lifts. Continuous magnetometer and soil probe surveys will be conducted. Mechanical excavation will cease within 6 in. of a cylinder.

All personnel within the EZ will be behind containment-grade polycarbonate shielding during any mechanical excavation operations.

Excavation side slopes of at least 1.5-ft to 1-ft will be maintained for entire excavation. Personnel access ramps of 3-ft to 1-ft slope will be maintained for every 25 linear ft of excavation perimeter.

6.20.4.2 Hand Excavation. Hand excavation will be used for careful removal of soils close to buried cylinders. Hand excavation will be performed using nonsparking hand tools.

6.20.4.2.1 Responsibilities—The FTL will direct the remediation technicians and ensure they communicate as needed with other field personnel.

6.20.4.2.2 Hazards Identification and Reduction—The hazards associated hand excavation is as follows:

Excavation stability – The excavation will be sloped a minimum of 1.5-ft horizontally to 1-ft vertically (34 degrees from horizontal) in accordance with INEEL procedures.

Damage to and rupture of buried compressed gas cylinders – These hazards include damage to buried cylinders by impact from shovels during hand excavation. The areas identified as containing buried cylinders identified by magnetometer surveys will be clearly marked with pin flags and nontoxic spray paint. Remediation technicians will be briefed on the location of buried gas cylinders during each tailgate health and safety meeting. The continuous magnetometer surveys will minimize the possibility of inadvertent shovel contact with buried cylinders. The remediation technicians will exercise care when shoveling around cylinders.

6.20.4.2.3 Equipment and Materials—

- Containment grade polycarbonate mobile barricades (48 in. × 60 in.)
- Fiberglass soil probe
- Nonsparking hand tools.

6.20.4.2.4 Methods—Excavation work will be performed in one 20-ft × 20-ft work area at a time. Continuous magnetometer and soil probe surveys will be conducted. Soils will be excavated mechanically from the work area in 6-in. lifts and will stop if a cylinder is within 6 in. Hand excavation will be performed within 6 in. of a cylinder.

> *Excavation side slopes of at least 1.5 ft to 1 ft will be maintained for entire excavation. Personnel access ramps of 3-ft to 1-ft slope will be maintained for every 25 linear ft of excavation perimeter.*

6.20.4.3 Robotic Excavation. Because CPP-84 is expected to contain only construction gas cylinders, robotic excavation is not anticipated. Robotic excavation will be considered if preliminary cylinder inspections or laboratory sampling indicate the presence of shock-sensitive or poisonous gases, incompatible gas mixtures, or unstable gas cylinders. Robotic equipment will not be mobilized to the site unless cylinders are identified that are determined to be too dangerous to allow personnel to perform the removal action.

The purpose of robotic excavation would be to allow excavation of cylinders that are too dangerous for personnel to be near. The robotic manipulator can also deploy air monitoring equipment and magnetometers. Visual observations are made through a closed-circuit camera mounted on the robotic manipulator. The following sections outline the specific procedures for robotic excavation in case it is required.

6.20.4.3.1 Responsibilities—Robotics personnel are responsible for setting up the robotics equipment and operating the robotics manipulator. These personnel takes direction to excavate soils, deploy monitoring equipment, and handle cylinders from the FTL.

6.20.4.3.2 Hazards Identification and Reduction—

Special hazards are associated with the heavy equipment used in robotic excavation. These hazards and their mitigation steps are as follows:

- **Crushing and impact hazards** – These hazards include injury to personnel from being caught between the body and tracks of the excavator and personnel being hit by a swinging excavator bucket. Personnel will not be in the excavation area during robotics operation.

- **Excavation stability** – The excavation will be sloped a minimum of 1.5-ft horizontally to 1-ft vertically (34 degrees from horizontal) in accordance with INEEL procedures.

- **Damage to and rupture of buried compressed gas cylinders** – These hazards include damage to buried cylinders by crushing from equipment on top of buried cylinders and damage to cylinders from excavator bucket during mechanical excavation. The excavation equipment will not be driven over, or placed on top of, buried gas cylinders. The areas identified as containing buried cylinders identified by magnetometer surveys will be clearly marked with pin flags and nontoxic spray paint. Robotics personnel will be briefed on the location of buried gas cylinders during each tailgate health and safety meeting. The continuous magnetometer surveys will minimize the possibility of the excavator bucket contacting cylinders causing a rupture. The excavator bucket will be "toothless" to minimize the damage to a cylinder caused by errant contact. Threats to personnel are minimized because personnel are not allowed in the excavation area during robotic excavation.

6.20.4.3.3 Equipment and Materials—

- Cat 320 or equivalent track-hoe excavator with ERC Cylinder Grappler® attachment and containment grade polycarbonate operator shielding. **Note:** No equipment operator will be present during robotic excavation.

- Schilling T3 remote-controlled lifting device, manipulator w/6D egress freedom.

- Trailer control center.

6.20.4.3.4 Methods—The primary purpose of robotics excavation is to eliminate human exposure to hazards deemed excessively dangerous. In these situations, robotics excavation will be used to uncover, inspect, survey, and remove cylinders from the landfill.

6.20.4.4 Removal, Segregation and Storage of Cylinders. This task consists of the actions to remove the cylinders from the excavation and move them to the temporary cylinder storage area. This task follows the preliminary cylinder evaluation and is only performed on "stable" cylinders with proper valve protection.

6.20.4.4.1 Responsibilities—The equipment operators and remediation technicians will perform the removal, segregation, and storage of the cylinders under the immediate supervision of the cylinder identification task manager.

6.20.4.4.2 Hazards Identification and Reduction—

- **Traffic –** These hazards include injury to personnel and damage to equipment due to collisions. Equipment operators will use spotters when backing. All personnel will maintain eye contact with equipment operators when moving around equipment.

- **Crushing and impact hazards** – These hazards include injury to personnel from being caught between the body and tracks of the excavator and personnel being hit by a swinging excavator bucket. These hazards will be minimized by limiting personnel access to areas within the "swing" area of the excavator bucket. Personnel will enter the "swing" area only after making eye contact with the operator. The equipment operator will not operate the equipment will personnel are within "swing" range.

- **Excavation stability** – The excavation will be sloped a minimum of 1.5-ft horizontally to 1-ft vertically (34 degrees from horizontal) in accordance with INEEL procedures.

- **Damage to and rupture of buried compressed gas cylinders** – These hazards include damage to buried cylinders by crushing from equipment on top of buried cylinders and damage to cylinders from the grappler device during cylinder retrieval. The excavation equipment will not be driven over, or placed on top of, buried gas cylinders. The areas identified as containing buried cylinders identified by magnetometer surveys will be clearly marked with pin flags and nontoxic spray paint. Equipment operators will be briefed on the location of buried gas cylinders during each tailgate health and safety meeting. The continuous magnetometer surveys will minimize the possibility of the backhoe driving over cylinders causing a rupture. Technicians will be behind the polycarbonate barricades during the initial cylinder retrieval efforts.

6.20.4.4.3 Equipment and Materials—

- Case 580 or equivalent back-hoe with ERC Cylinder Grappler® attachment and containment grade polycarbonate operator shielding
- Containment grade polycarbonate mobile barricades (48 in. by 60 in.)
- Two rubber tire cylinder dollies
- 10 six-cylinder racks
- 32 ½-in. × 24-in. steel rebar lengths for securing cylinder racks.

6.20.4.4.4 Methods—The cylinders will be removed from the excavation with cylinder grappler attachment on a backhoe. The cylinders will be placed on a flat area approximately 10 ft outside the excavation. The remediation technicians will transfer the cylinders to the storage area using a cylinder dolly.

The cylinders will temporarily stored in a designated storage area. This area will be an EZ and will demarcated by orange fencing and signs as described in the site setup task. Cylinders will be segregated into two categories, flammable and nonflammable, and staged in separate cylinder storage racks separated by at least 50 ft. Cylinders will be stored in a cylinder storage rack. Each cylinder rack will be situated at least 30 ft apart and clearly marked flammable or nonflammable. The racks will be anchored to the ground with steel rebar and have straps to secure the cylinders.

7. SAMPLING, TREATMENT, AND DISPOSAL

This section describes the sampling, treatment, and disposal of cylinders removed from CPP-84. Soil sampling at CPP-84 and CPP-94 is also required to verify that COPCs have been removed by the remedial action. Backfill and regrading operations will follow confirmation of contaminant removal.

Sampling of all cylinders will likely be required due to the uncertainty of using external characteristics to define cylinder contents. Toxic gas cylinders are not expected to be recovered from CPP-84 and cylinder contents can either be thermally oxidized (for flammable gases) or vented to the atmosphere (for inert gases). The disposal of cylinders after treatment is dependent on cylinder contents. Prior to sending wastes to an off-Site (off of the INEEL) storage, treatment, or disposal facility, a suitable assessment will be performed in accordance with 40 CFR 300.440.

7.1 Objectives and Approach

The objective of cylinder sampling is to determine the contents of each of the cylinders. This is a fundamental requirement since knowledge of cylinder content is required prior to treatment (venting or flaring) or off-Site transportation. CGA P-22 offers the following guidance:

> "Any inconsistency, question, or lack of knowledge about the cylinder is cause for requiring positive identification through sampling and analysis . . . Equipment used for sampling cylinder contents should be rated for the maximum pressure which could be in the cylinder with a suitable safety factor applied for potentially over-pressurized containers."

After cylinder contents are identified using an onsite laboratory, treatment methods can be determined. Figure 7-1 provides a cylinder sampling and treatment flow chart that summarizes sampling and treatment options. These options include onsite operations (venting and flaring) and off-Site treatment.

Soil data will be collected at CPP-84 and CPP-94 at the conclusion of cylinder removal activities. The purpose of this data collection effort is to provide a characterization of the excavation bottom. Soil samples will be collected and analyzed for COPCs at an off-Site laboratory. Details of this soil sampling are provided in the *Preliminary Characterization Plan for OU 3-13, Group 6, RD/RA Buried Gas Cylinders Sites: CPP-84 and CPP-94* (DOE-ID 2001a) (Attachment 1).

7.2 Cylinder Sampling

Cylinder sampling techniques are based solely on cylinder and valve integrity. For cylinders with operable valves, a remotely operated system, the VSS will be used. This system allows the operator to remotely view the sampling operation using video equipment. For cylinders that are in poor condition or with inoperable valves, the CRV will be used. The CRV is a remotely operated, pressure-rated vessel that is housed within in a secondary containment chamber for the containment of fugitive gases. The cylinder is pierced within the CRV, allowing the contents of the cylinder to be sampled and analyzed.

7.2.1 Valve Sampling Station (VSS)

The VSS is designed to provide remote valve sampling capabilities for compressed gas cylinders with operable valves. The unit consists of a 54-in. × 54-in. × 84-in. containment structure, which is constructed of 1/4-in.-thick steel plate which is trailer- or vehicle-mounted. Other components of the system include a secondary containment structure, remote valve opening capabilities, video equipment, and emergency treatment capabilities. Figure 7-2 provides a schematic of the VSS. Complete process engineering diagrams and operating procedures will be available at the job site.

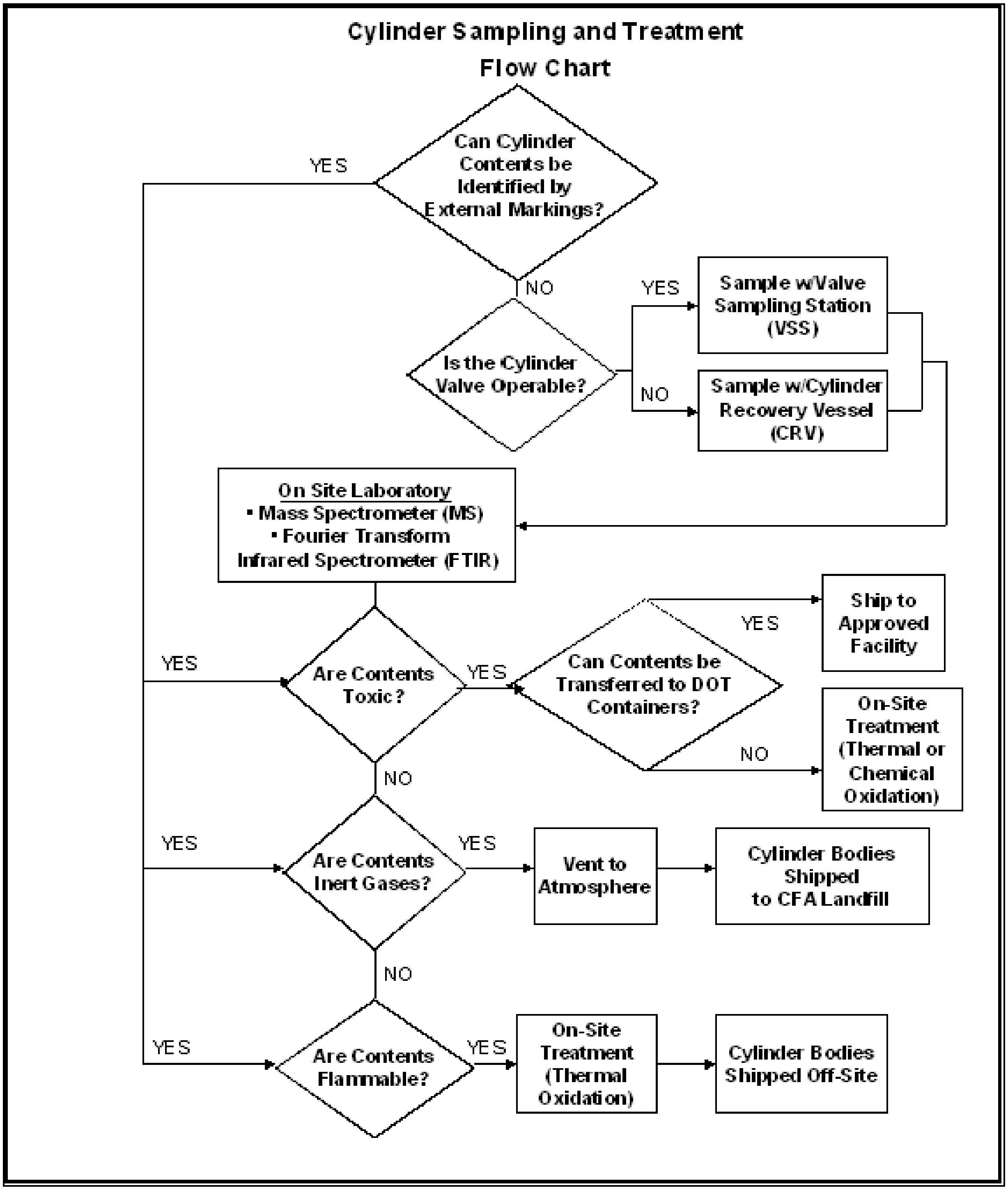

Figure 7-1. Cylinder sampling and treatment flow chart.

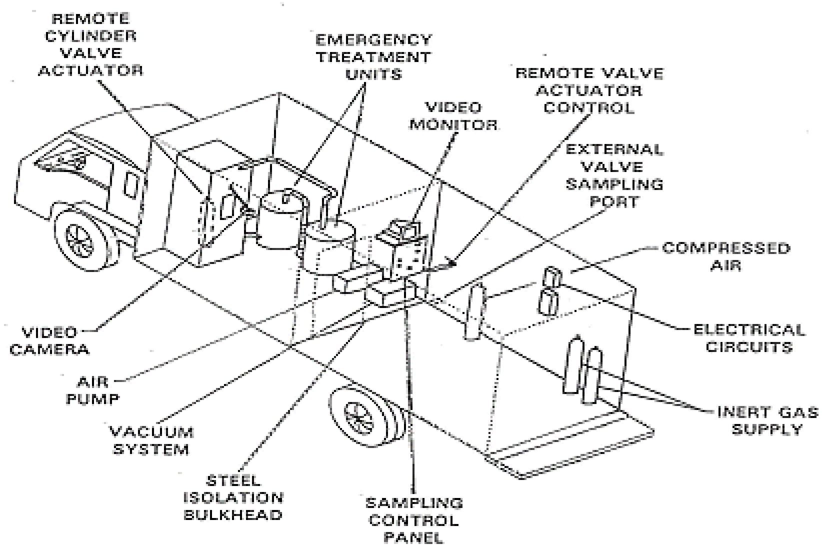

Figure 7-2. Schematic of the VSS.

7.2.2 Cylinder Recovery Vessel (CRV)

The CRV is designed to sample liquids and gases in cylinders that cannot be accessed through the valve or because the cylinder is deteriorated and/or in unstable condition. The CRV provides a remotely operated system to release typical cylinder contents into a controlled, contained environment. After sampling and analysis of cylinder contents, the material can be transferred to a new container or disposed through various treatment processes. Figures 7-3 and 7-4 provide a photograph and a schematic of the CRV.

The CRV door is hydraulically operated and contains two o-rings that provide a vapor-tight seal to the outside environment. As the cylinders are loaded into the unit and supported on a specially designed equipment rack, a spring mechanism holds the cylinder in position in the center of the vessel. The cylinder is accessed by either shooting a nitrogen-powered steel projectile through the cylinder wall or using a tapping device. Once the cylinder has been pierced, sampling is completed through a sample port for analysis at the onsite laboratory. Complete process engineering diagrams and operating procedures will be available at the job site.

7.2.3 Sample Analysis

Analysis of cylinder contents will be performed by two methods: (1) FTIR or (2) MS. The infrared spectrum contains characteristics that permit identification of functional groups, or "working parts" of molecules. Through the use of an interferometer, infrared wavelengths are passed through a sample simultaneously. A laser is used to align the optics used in the process.

The FTIR will be used to qualitatively identify cylinder contents through a comparison of spectra with library references. Spectral libraries are maintained with the laboratory computer. Computer libraries are supplemented by several standard hard-copy references. The FTIR is applicable for all but elemental gases (oxygen, nitrogen, etc.). For elemental gases, the MS is the preferred method of analysis

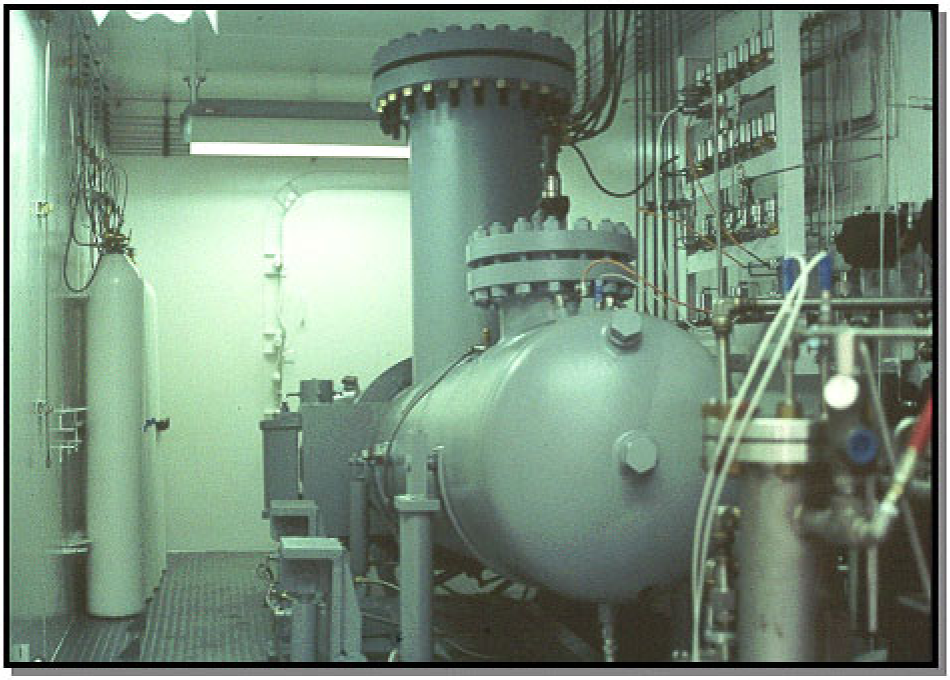

Figure 7-3. Photograph of CRV.

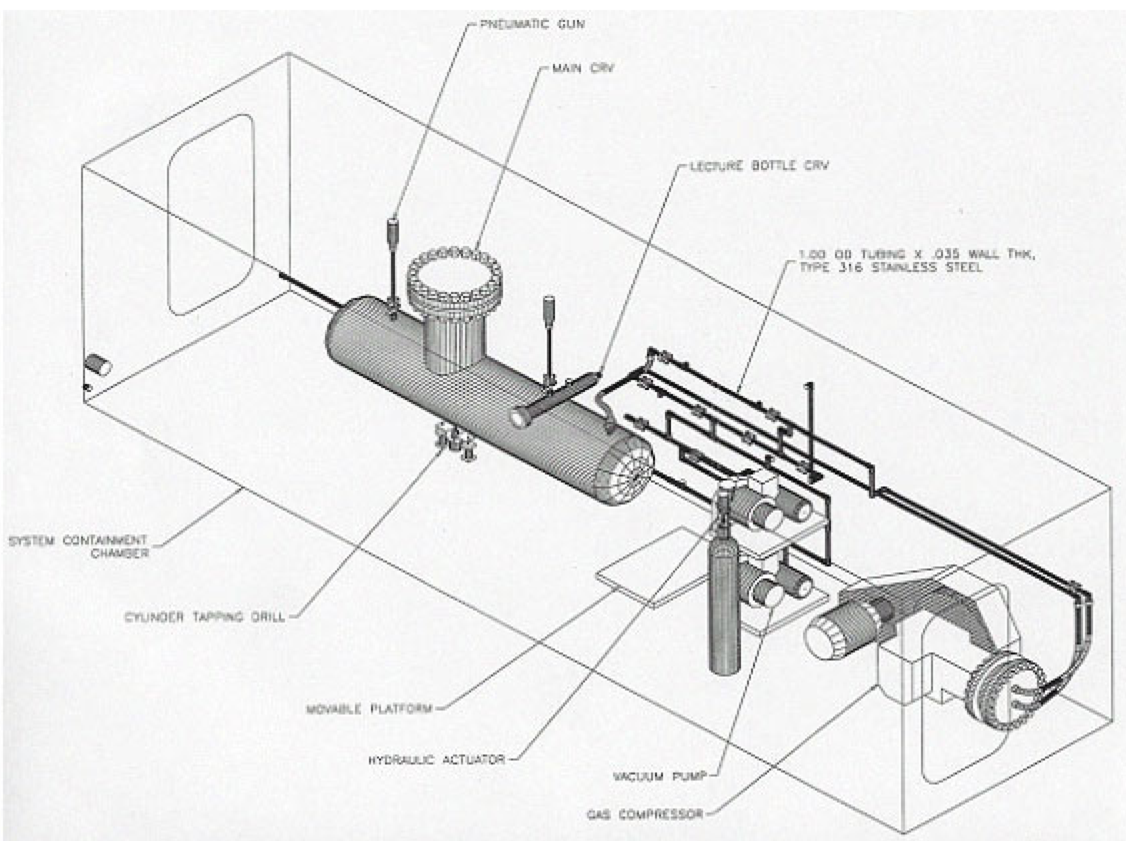

Figure 7-4. Schematic of CRV.

The MS is a vacuum analyzer, which will measure total and partial pressures. The analyzer is a quadruple mass spectrometer that is capable of separating ions formed in an electron impact source according to the mass-to-charge ratio. The signal collector is either a Faraday Cup or Secondary Emission Multiplier.

The QA/QC procedures used for the instruments will be used only on qualitative analyses. Sample folders will be developed for each cylinder processed. Both the FTIR and MS are computer-supported and calibration/analyses data will be stored at the site on diskette. A hard copy of the spectrum will also be obtained and stored with project records. General items provided in the sample folders include sample identification number, date and time of analysis, and cylinder inspection log reference. Table 7-1 provides a summary of the specific calibration and operation data for each instrument.

7.2.4 Fourier Transform Infrared Spectrometer

Mathematical manipulation of the interference data allows identifying characteristics to be developed. Software used with the FTIR facilitates matching of spectra against various libraries of more than 15,000 compounds. The spectrum is mathematically converted to absorbance. The absorbance spectrum is then compared to those contained in the reference libraries.

Several FTIR spectral libraries are maintained on the laboratory computer. These include the 3,000 compound EPA Vapor Phase Library, a gas library, and Aldrich's library of compounds (30,000 compounds). Database searches are conducted with Sprouse Scientific Search software. The computer libraries are supplemented by several standard reference books.

The FTIR will be checked daily for operability in accordance with the equipment manual. A polystyrene film is used for calibration and checked against three principal peaks (702, 1602, 3025 cm^{-1}). The QA/QC plan for the mobile laboratory specifies the frequency and limits of calibration.

7.2.5 Mass Spectrometer (MS)

The MS to be used at the site can identify compounds between 1 and 300 a.m.u. This will cover the range of elemental gases that are not identifiable with the FTIR. It will be calibrated at the beginning and end of each day using bromofluorobenzene (BFB) as a standard.

Mass spectrums for each sample are shown as peaks. A hard copy and electronic copy are provided for each analysis. The spectrum is then compared with library spectra for aiding identification. MS data are compared to a proprietary library of compiled cracking patterns (0 to 200 a.m.u.). The library contains both mass data and peak intensities for approximately 50,000 compounds.

Table 7-1. Specific calibration and operation data.

FTIR	MS
Wavelength tune spectrum	Argon tune
Wavelength tune check (polystyrene)	BFB start analog plot and form
Spectrum and form	
Plots of blanks and sample spectra	BFB end analog plot and form
Wavelength and tune checks (end of day) spectrum and form	Interpretation and reference spectra
Interpretation and computer match	Analog plots of blanks and sample

Spectra selected from the search are compared with known chemical characteristics of the sample gas. In some cases, physical observations obtained during sampling can confirm the interpretation. Both MS and FTIR spectra are contained in the Chemical Information System database. This computerized database can be accessed on-line.

7.3 Treatment of Cylinder Contents

Analysis will confirm whether the gases contained in the cylinders are common industrial gases typically associated with construction operations. Following laboratory confirmation of cylinder contents, the industrial gases will be disposed of by either controlled venting or flaring. These treatment processes will render the cylinders as being empty in accordance with the definition of 40 CFR 261.7(b)(2). If cylinders contain gases other than the expected construction gases, they will either be treated on-site or be shipped to an appropriate off-site facility.

7.3.1 Treatment of Anticipated Gases

Controlled venting of the contents is an option suitable for inert or innocuous materials. Typically these are common components of air. These atmospheric gases include air, argon, carbon dioxide, oxygen, helium, and nitrogen. The primary hazard associated with these gases is concentration in a confined area. Controlled and monitored venting will permit these to be released without further processing.

Acetylene is the only anticipated flammable gas to be encountered during the removal action. Cylinders containing acetylene will be treated via thermal oxidation. The feed rate of the acetylene gas will be monitored as well as the surrounding areas to ensure that excessive pressure is not built up in the system and no explosive atmospheres are created.

The techniques used to vent inert gases or thermal oxidize the acetylene are essentially the same and use the same equipment. Gases will be vented through an established flare stack. The flare stack consists of lines (1-in. diameter or less) connecting the sampling device with an industrial burner and pilot light. A flash arrestor will be installed in the line prior to the burner to prevent flushing back to the ignition source. The stack will be located at least 50 ft from any source of ignition other than the associated pilot flame. A clear zone of the same radius will be maintained during the processing. The flame will be fueled from a propane cylinder located outside of the clear zone. A fire watch will be maintained from the start of venting until 30 min after the flaring is concluded. The clear zone shall be delineated to prevent unauthorized personnel from entering the area while a flame is present or while the burner is still hot. Perimeter monitoring will occur for LEL, percent oxygen, and SO_2. The venting and flaring requires evacuation and purge cycles to assure that residual gases are removed from each container. General operating procedures are as follows:

1. Identify personnel

   a. Trained operator to feed the gas

   b. Trained watch to observe the burner/outlet

2. Conduct preoperational checks

   a. Pressure test and inspect the feed and burner system

   b. Compare each cylinder to the analytical results to verify contents

c. Inspect the fuel supply system for secure fittings, condition, and proper pressure regulator adjustment

3. Establish safety systems

    a. Establish radio communications between operator and watch

    b. Provide fire extinguisher at watch location

    c. Exclude flammable materials from the area

4. Conduct treatment operations

    a. Notify watch the feeding will commence

    b. Open valves to feed gas

    c. Monitor system pressure to ensure it is maintained within established limits

    d. Continue feed until cylinder pressure reaches atmospheric

    e. Evacuate feed lines

    f. Purge system with nitrogen

5. Conduct post-treatment activities

    a. Continue watch for 30 min after completion of treatment

    b. Dispose of empty cylinders in accordance with the *Waste Management Plan*.

7.3.2 Treatment of Non-Anticipated Gases

Although it is unlikely that other gases will be encountered during this project, treatment options for nonanticipated gases require identification. If other gases are retrieved, they will be managed and treated on a case-by-case basis depending on the characteristics of the gas. These gases may be treated onsite or sent to an appropriate off-Site facility for treatment and disposal.

Depending on the gas type, onsite treatment may be conducted using the venting or thermal oxidation described above, or by more complex catalytic or chemical oxidation technologies. Due to the large number of gases, it is not feasible to describe a detailed treatment process for every gas type. Table 7-2 describes suitable methods for managing a variety of common gas types that could be encountered.

See Appendix E for information on management and on-Site treatment of non-anticipated gases that were identified during excavation activities on June 10, 2004. If additional cylinders containing unexpected gases that require on-Site or off-Site treatment or disposal are identified, the Agencies will be provided this information via a conference call or email. The RA report will be used to document the information on these unexpected gases, the on-Site or off-Site treatment process, and management of the wastes.

Table 7-2. Treatment methods for non-anticipated compressed gases. (DLA 1990)

Gas	Treatment
Anhydrous ammonia	Convert to ammonium nitrate by passing vapors into nitric acid solution
Chlorine	Neutralize by passing vapors into 18–20 % sodium hydroxide solution
Dimethylamine	Neutralize by passing vapors into a nitric acid solution
Ethyl chloride	Neutralize by passing vapors into sodium hydroxide solution
Hydrogen chloride	Neutralize by passing vapors into sodium hydroxide solution
Hydrogen sulfide	Neutralize by passing vapors into sodium hydroxide solution
Methyl bromide	Neutralize by passing vapors into sodium hydroxide solution
Methyl chloride	Neutralize by passing vapors into sodium hydroxide solution
Liquefied petroleum gas	Thermal oxidation
Phosgene	Neutralize by passing vapors into sodium hydroxide solution
Sulfur dioxide	Neutralize by passing vapors into sodium hydroxide solution

7.4 Post-Removal Characterization Activities

Post-removal characterization activities at CPP-84 and CPP-94 consist of (1) soil sampling to estimate the average concentrations of COPCs in the excavation and, if needed, the spoil pile and (2) a confirmation magnetic field survey. Based on the DQOs of this project, a simple random sampling design (utilizing composite samples) will be used for locating sampling locations (Table 3-2). The design described in this section allows for estimating the variability (standard deviation) of the COPCs (if present) and also allows for comparing the COPCs against action levels using a student's *t*-test. The option to collect additional biased samples will be reserved if evidence (such as discoloration, staining, textural differences, odors) indicates contaminants could be present in an area that might otherwise be missed (e.g., spoil pile, excavation portions not containing cylinders). The following statistical parameters, sample frequency, and sampling techniques described in this section were established using EPA guidance:

- Confidence Level: 80%
- Minimum Detectable Difference: 30%
- Power: 90%
- Coefficient of Variation: 30%
- Five samples (plus 1 duplicate) from CPP-84 excavation and, if needed, samples from the spoil pile
- Five samples (plus 1 duplicate) from CPP-94 excavation and, if needed, samples from the spoil pile.

7.4.1 Sampling Design for Excavated Areas

7.4.1.1 Establish Sampling Grid. Using maps, the excavated areas will be divided into grids. Grid cell sizes will be determined in the field based on the size and distribution of the cylinder area. The following procedures will establish the sampling grid:

1. Measure the horizontal (*x-y*) extent of cylinder distribution in square feet (ft^2). Assess the distribution of the cylinders on the horizontal plane. If there are significant gaps or distances between cylinders that would cause the sampling of > 1 grid cell that did not contain a cylinder (and there is no visual evidence of contamination), then do no include that area in the calculation of cylinder distribution. The purpose is not to include large portions of the excavation in which no cylinders were present.

2. If the area of cylinder distribution is <750 ft^2, then divide the site into a minimum of 30 equally sized grid cells.

3. If the area of the cylinder distribution is >750 ft^2, then establish grid sizes of 25 ft^2 (e.g., 5 × 5 ft).

4. After establishing the grid size and dividing the site into grid cells, assign a unique two digit number (01, 02…30) to each grid (if more than 99 grids are required, use a three-digit number).

5. Select five grid cells for sampling using a random number generator or table.

6. Document all activities, drawing, calculations, and measurements in the field logbook.

7.4.1.2 Collect Bulk Soil Samples. At each sampling grid, bulk quantities of soil will first be collected. Each sample will be a composite of five aliquots (i.e. sub samples, portions) using a '5 on die' design (see Figure 7-5). The following procedures describe how to collect the bulk soil samples (Pitard 1989):

1. At each composite location within a grid, use a disposable/dedicated spoon to collect surface samples (using the bottom of the excavation as the revised 0 datum point) from 0 to 2.5 cm (1 in.) of soil. Place the soil into a large sealable plastic bag (similar to Ziploc™) and label appropriately.

   Note: For this project, soil is defined as particles ≤2 mm in diameter and absent of gross size organic materials. If sieving is required, pass the soil through a pre-cleaned #10 (2 mm) sieve (#9 Tyler equivalent).

2. For volatile organic compound (VOC) samples, place sample aliquots directly into the appropriate sample jar and fill to minimize headspace. The priority for minimizing the amount of time the soil is exposed to air outweighs the additional rigor on optimizing sample representativeness.

3. Estimate the amount of soil needed from each aliquot so that the bulk volume collected at each grid is about 50% more than the amount needed for filling analytical sample jars.

   Note: For the duplicate sample, collect enough sample material to fill two sets of analytical sample jars.

4. Label the sealable plastic bags with the date, location, and sample number using an indelible marker, and keep the sample securely stored at 4°C until ready for sample processing.

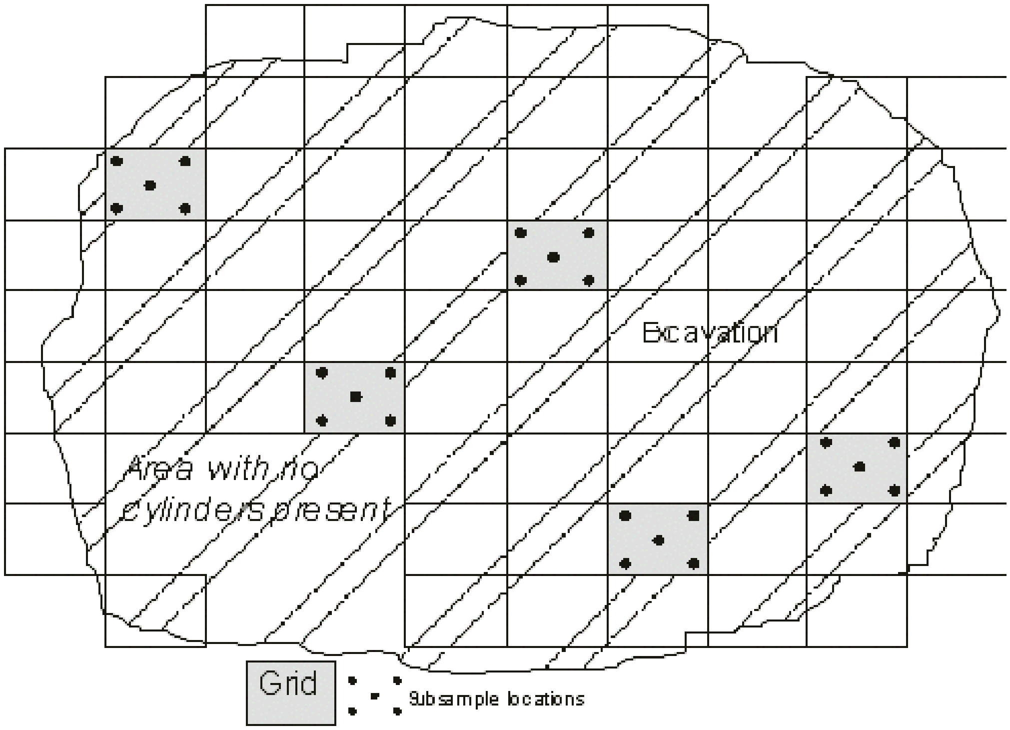

Figure 7-5. Hypothetical sampling grid.

7.4.1.3 Sample Processing. A one-dimensional incremental delimitation method will be used to process the bulk samples into individual analytical samples. The following describes the how to process the bulk soil samples:

1. Prepare the appropriate number and types of empty sample jars as required. Remember to prepare additional jars for the duplicate sample.

2. For each sample, line the bottom of a flat-bottom tray (e.g., cookie sheet, food tray) with new aluminum foil. Transfer the soil from a sealable plastic bag onto the tray and shape the soil into a flat rectangular pile with uniform thickness.

3. Using a disposable/dedicated flat-bottom spatula, collect increments across the soil pile and place them into the sample jars in a sequential fashion. Ensure that each spatula scoop encompasses the entire profile of the soil pile (i.e., include soil fines).

4. Reshape the soil pile as necessary to maintain uniformity. Use at least 25 to 30 increments to fill each jar. Continue until all sample jars are about 90% full.

   Note: Because VOC samples are already collected directly into their sample jars in the field, no further sample processing is required.

1. Ensure all jars are labeled with all the necessary information for shipment to the laboratory. Securely maintain the sample at 4°C until ready for shipment to the analytical facility.

7.5 Disposal

Empty cylinders, if not recycled, will be disposed of in accordance with the Waste Management Plan.

7.6 Backfilling

When verification sample results indicate that site contamination levels are within acceptable limits and the ER department approves the results, the excavated areas will be backfilled. Clean fill material staged near the excavation will be placed in 8-in. loose lifts and compacted to approximately 90% of maximum dry density of the soil with heavy equipment (e.g., bulldozer and/or trackhoe). Figure 7-6 shows a backfilling operation. In the event that heavy equipment is too large to effectively provide compaction, smaller compaction equipment (such as walk-behind roller compactors, mechanical tampers, or vibratory plates) will be used. It may be necessary to add clean water at times to reach the necessary compaction.

All excavations will be surveyed prior to backfilling and restoration. Backfill material will support revegetation. When the original grade is restored, the disturbed areas will be revegetated with native species according to *Guidelines for Revegetation of Disturbed Sites at the INEL* (Anderson and Shumar 1989).

Figure 7-6. Backfilling operations.

8. FIELD DOCUMENTATION

The primary objective of this section is to describe how field activities will be documented. Accurate and consistent documentation of field activities is essential to the success of the project. Documentation will be maintained in accordance with applicable management control procedures (MCPs) and other contractor documents. The FTL will be responsible for controlling and maintaining all field documents and records. In addition, a RA report is required to document the field activities. The RA report will be submitted 60 days after the final inspection by the Agencies as defined in the FFA/CO (DOE-ID 1991).

8.1 Audits

Audits of various field documents may be performed throughout the duration of the project. This will ensure documentation is sufficient and meets the requirements established in MCPs, and other applicable programs, procedures, and policies.

8.2 Logbooks

Field logbooks contain records of all activities related to onsite actions. Data recorded in logbooks include information on excavation activities, sampling, measurements taken, soil descriptions, cylinder locations, and observations or conditions that could affect the quality of data. Using logbook data, personnel should be able to reconstruct events that occurred during field activities. At a minimum, a field logbook should contain the following information:

- Modifications to activities or procedures described in planning documents
- Justifications for such modifications
- Unusual occurrences or circumstances
- Any audit findings and corrective actions implemented as a result of such findings.

All entries shall use nonsmearable, waterproof permanent ink (preferably black), they must be signed and dated, and all changes must be legible. Drawing a single line through the incorrect information and signing and dating the change make changes. Logbook control and use shall be in accordance with INEEL procedures.

Logbooks are issued to specified personnel who are then responsible for security and return of logbooks at the conclusion of the project. Original logbooks will become part of the project records and will be maintained by Administrative Records and Document Control (ARDC).

8.2.1 Field Team Leader's Daily Logbook

In addition to the elements listed above, the FTL logbook should contain the following:

- Description of field activities
- Excavation inspections
- Visitor log

- List of site contacts
- Problems encountered.

This logbook will be signed and dated at the end of each day's sampling activities.

8.2.2 Sample Logbooks

Sample logbooks will be used by the sample team(s). Each sample logbook will contain information such as the following:

- Physical measurements
- All QC samples
- Sample information (sample IDs, sample location, sample collection information, analyses requested for each sample, and sample matrix)
- Shipping information (collection dates, shipping dates, cooler identification number, destination, COC number, and name of shipper).

8.2.3 Field Instrument Calibration/Standardization Logbook

A logbook containing records of calibration data will be maintained for each piece of equipment requiring periodic calibration or standardization. Equipment requiring calibration includes, but is not limited to, PID, explosivometers, magnetometers, radiological monitoring equipment, the FTIR, and MS. This logbook will contain log sheets to record the date, time, method of calibration, name of the calibrating individual, and instrument identification number.

8.3 Data Management and Inventory Control

Data management and inventory is an important aspect of field documentation. The *Data Management Plan*, provides additional detail about the management of analytical data.

8.3.1 Data Management

All original data collected in the field will be retained in accordance with Section 20.2 of the INEEL FFA/CO, DOE Order 200.1, and any other contractor document requirements. All data will be forwarded to ARDC as part of the project file or uploaded into the ERIS database, as required.

Electronic data will be managed in accordance with DOE Order 200.1 in specially designed Microsoft Excel files; these files will be compatible with site databases. An example spreadsheet that captures all information for each cylinder is shown as Figure 8-1.

8.3.2 Inventory Control

Upon excavation, each cylinder will be marked with a unique identifier that can be traced back to the location where the cylinder was unearthed. A label, tag, or other means that results in legible and long lasting marking will used. This cylinder identification number will be used to track cylinders throughout the project.

INEEL

Cylinder ID	Suspected Contents	Rack Location	Date Excavated	Time Excavated	Excavation Location	Valve Configuration	Analytical Results	Sample Method	Comments
C77-84-0001	Oxygen		5/01/00	0800	C1				
C77-84-0002	Oxygen		5/01/0	0800	C1				
C77-84-0003	Acetylene		5/01/00	0800	C1				
C77-84-0001	Argon		5/01/00	0800	C1				
C77-84-0001	Argon		5/01/00	0800	C1				
C77-84-0001	Argon		5/01/00	0800	C1				

Figure 8-1. Example data sheet.

The movement of materials and equipment necessary to complete the project will also be tracked. Dates and times that major pieces of equipment (i.e., track hoe, laboratory instrumentation, etc.) come into service and leave the site will be tracked.

8.4 Reports

Several reports will be generated during the performance of this project including daily, weekly, and a final report. Daily reports will serve to communicate daily status. Weekly reports will be generated providing percent complete, specific accomplishments, problems encountered, and other relevant information. A RA report including results and conclusions will be generated at the end of the project.

8.4.1 Daily Reports

Status of project activities will be communicated to project management on a daily basis. The purpose of this is to keep project management apprised of progress, issues, and to coordinate resources as needed. Reporting will typically be informal and may be performed over the telephone, in person, email, or by other means.

8.4.2 Weekly Reports

Weekly status reports will be generated as required. These reports will summarize project status, accomplishments, problems encountered, and recommended actions. The percent of project completion to date will be provided also.

8.4.3 Remedial Action (RA) Report

The remedial action process includes the preparation of at least on primary and one secondary document. The prefinal inspection report will be a secondary document that will include the following:

- Outstanding construction requirements
- Actions required to resolve items
- Completion date
- Date of final inspection (**Note:** If a final inspection is deemed to not be necessary, the prefinal inspection will be used as the final inspection.).

The prefinal inspection will be conducted by the PM, at a minimum, and possibly by an independent fourth party. All comments will be finalized in the primary RA report. To the extent possible, RA reports for individual work elements will be consolidated into a single RA report. The RA report will be prepared at the completion of remedial action and will include the following:

- A brief description of outstanding items from the prefinal inspection report
- Synopsis of work defined in the *RA Work Plan* and certification that this work was performed
- Explanation of any modifications to the *RA Work Plan*
- Certification that the remedy is operational and functional.

Documentation necessary to support a notice of completion as discussed in Part XXV of the FFA/CO (DOE-ID 1991). The documentation will be sufficient to support that no further remedial action, including institutional controls, is required.

8.5 Records and Reference Documents

The FTL will be responsible for controlling and maintaining all field documents and records and for verifying that all required documents to be submitted to the contractor ER ARDC are maintained in good condition. All entries will be made in indelible black ink. Entry errors will be corrected by drawing a single line through the error and entering the correct information. All corrections will be initialed and dated.

8.6 Training Records/Documentation

Proof that all required training courses have been completed (including applicable refresher training) must be maintained on the project at all times. Examples of acceptable written training documents include “40 Hour OSHA HAZWOPER Card,” “Respirator Authorization Card,” “Radiological Worker II Card,” “Medic/First Aid Training Card,” and/or a copy of an individual’s or department’s TRAIN System printout demonstrating completion of training. A copy of the certificate issued by the institution where the training was received is also acceptable proof of training. The radiological worker training must be documented on an official authorized card and have the designated INEEL site-specific training stamped or written on the card (unless issued prior to March 1997).

Before beginning work at the project, project-specific training will be conducted by the field CC, FTL, and/or HSO. This training will consist of a complete review of this HASP and attachments, with time for discussion and questions. Upon completing project-specific training, personnel will sign a training acknowledgement roster (Form 361.02) indicating that they have received this training, understand the tasks and associated hazards that will be conducted, and agree to follow all HASP and other safety requirements. Completed Form(s) 361.02 will be copied and maintained at the project, and the original will be sent to the ER Training Coordinator (MS 3902) within 5 working days.

If not previously completed, each 40-hour trained Hazardous Waste Operations and Emergency Response (HAZWOPER) worker must complete the HAZWOPER initial 24-hr supervised field experience training. Performance will be monitored by the FTL and/or HSO for three days of site activities for satisfactory work performance. For 24-hr trained HAZWOPER workers, the same procedure will be followed, except the supervised field experience will only last one day. Upon completion, the Field Experience Observation Checklist and Form 361.47 will be forwarded to the ER Training Coordinator (MS 3902) within 5 working days.

The FTL, HSO, and RCT, as applicable, will conduct a daily pre-job safety briefing of the task(s) to be performed that day. Pre-job briefings must be documented on Form 434.15, "Pre-Job Briefing Attendance Record" and perform requirements of Form 434.14 ("Pre-Job Briefing Checklist"). During this briefing, tasks are to be outlined, hazards identified, hazard controls and work zones established, PPE requirements discussed, and employees' questions answered. At the completion of this briefing, work control documents will be read and signed. Particular emphasis will be placed on lessons learned from the previous day's activities and how tasks can be completed in the safest, most efficient manner. All personnel will be asked to contribute ideas to enhance worker safety and mitigate potential exposures at the project.

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Appendix A

Project Costs

Project Summary Report

Project Name: *Operating unit 3-13, Group 6, Buried Gas Cylinders RD/RA WP SP6*
Project Location: *INTEC Buried Gas Cylinder Sites 84, 94*
Estimate Number: *2951-C*

Client: *R. L. Davison*
Prepared By: *J. Folker*
Estimate Type: *Project Support*

Level	Group	Description	Estimate Subtotal	Escalation	Contingency	Contingency %	TOTAL
5000		PROJECT MANAGEMENT	$189,917	$4,938	$21,432	11.00%	$216,287
1020		--Perform Task Supervision	$111,279	$2,893	$12,558	11.00%	$126,731
1025		--Perform Construction Management for Remediation Subcontract	$78,638	$2,045	$8,874	11.00%	$89,557
2000		ENGINEERING	$49,982	$1,300	$5,640	11.00%	$56,922
1030		--Update RD/RA Documents	$10,274	$267	$1,159	11.00%	$11,701
1045		--Comment Incorporation Group 6 RD/RA WP	$4,347	$113	$491	11.00%	$4,951
1150		--Prepare Draft Remedial Action Report	$16,038	$417	$1,810	11.00%	$18,265
1155		--ORB Review of Draft RA Report	$10,689	$278	$1,206	11.00%	$12,173
1170		--Incorporate Agency Comments Draft RA Report	$4,347	$113	$491	11.00%	$4,951
1185		--Incorporate Agency Comments Final RA Report	$4,286	$111	$484	11.00%	$4,881
8000		PROCUREMENT	$15,330	$399	$1,730	11.00%	$17,459
1060		--Develop Bid & Award Site 84 Remediation Activity	$15,330	$399	$1,730	11.00%	$17,459
9000		CONSTRUCTION	$275,229	$14,780	$108,806	37.52%	$398,815
1055		--Prepare Group 6 Construction Documentation	$24,555	$1,319	$9,707	37.52%	$35,580
1065		--Mobilize Group 6 Contractor for Site 84	$34,189	$1,836	$13,516	37.52%	$49,541
1070		--Excavation/Assessment Group 6 by Subcontractor	$55,279	$2,968	$21,854	37.52%	$80,101
1075		--Treatment & Disposal Group 6 Site 84 by Subcontractor	$15,150	$814	$5,989	37.52%	$21,953
1080		--Perform Group 6 Geophysical Sweep	$8,908	$478	$3,522	37.52%	$12,908
1090		--Perform Post Sampling Sites 84 & 94	$2,890	$155	$1,143	37.52%	$4,188
1100		--Sample Analysis and Validation	$28,454	$1,528	$11,249	37.52%	$41,231
1110		--Site Reclamation for Site 84 & 94	$54,440	$2,923	$21,522	37.52%	$78,885
1095		--Demobilization	$19,355	$1,039	$7,651	37.52%	$28,045

Project Summary Report

Project Name: ***Operating unit 3-13, Group 6, Buried Gas Cylinders RD/RA WP SP6***
Project Location: ***INTEC Buried Gas Cylinder Sites 84, 94***
Estimate Number: ***2951-C***

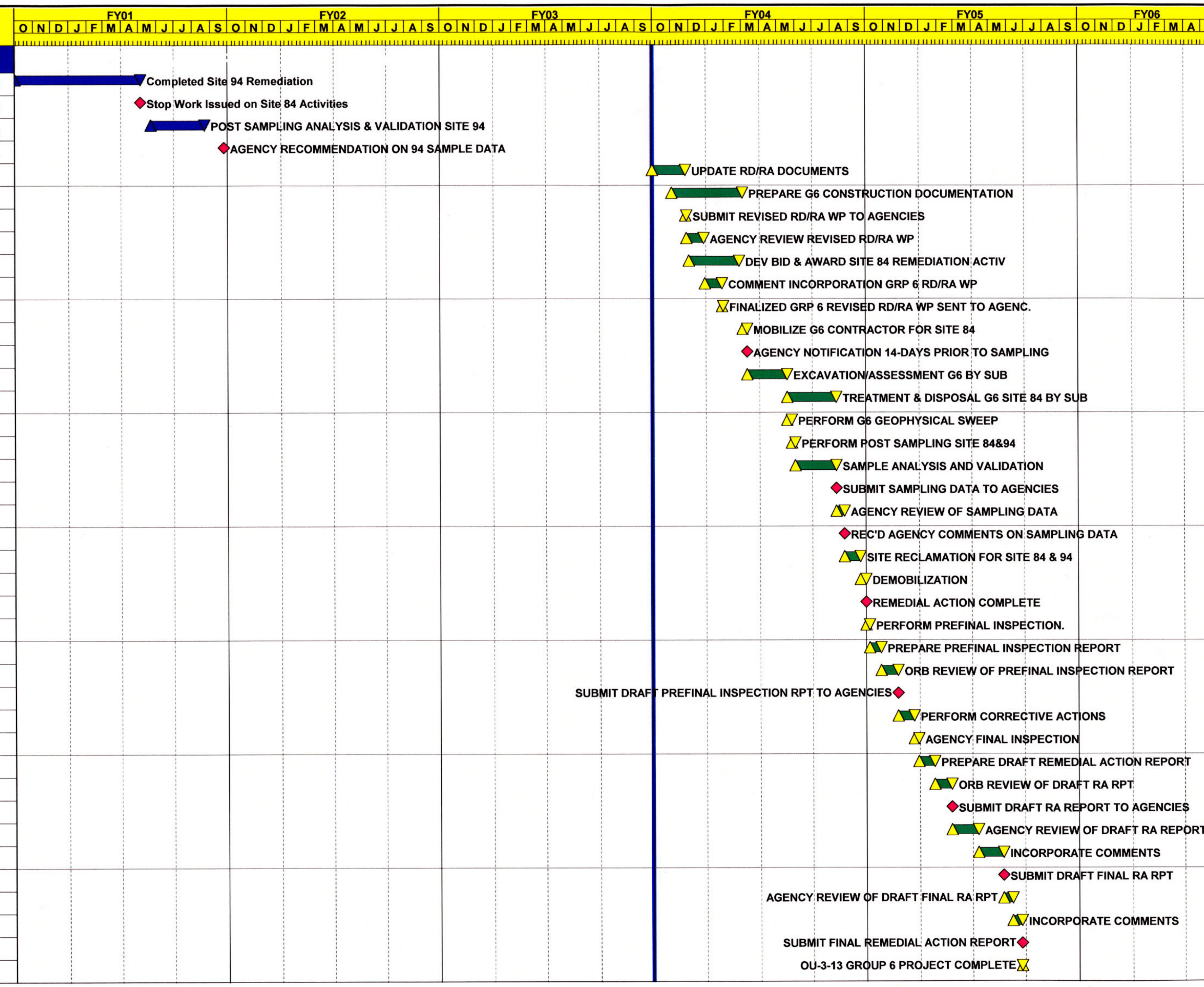
Client: ***R. L. Davison***
Prepared By: ***J. Folker***
Estimate Type: ***Project Support***

Level	Group	Description	Estimate Subtotal	Escalation	Contingency	Contingency %	TOTAL
1120		--Perform Prefinal Inspection	$5,490	$295	$2,170	37.52%	$7,955
1125		--Prepare Prefinal Inspection Report	$2,404	$129	$951	37.52%	$3,484
1130		--ORB Review of Prefinal Inspection Report	$5,862	$315	$2,317	37.52%	$8,494
1140		--Perform Corrective Actions	$16,228	$871	$6,415	37.52%	$23,515
1145		--Agency Final Inspection	$2,025	$109	$800	37.52%	$2,934
GAPIF		BBWI MATERIAL HANDLING FEE	$510	$0	$56	11.00%	$566
10000		ICP ALLOCATION	$88,236	$4,738	$34,884	37.52%	$127,859
Total		INTEC CERCLA Remediation of Gas Cylinder Sites-Group 6 RD/RA WP	$619,205	$26,154	$172,549	26.74%	$817,909

Appendix B

Project Schedule

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
GROUP 6 RD/RA WORK PLAN SCHEDULE				
1010	Completed Site 94 Remediation	1	29SEP00A	03MAY01A
1020	Stop Work Issued on Site 84 Activities	0		04MAY01A
1000	POST SAMPLING ANALYSIS & VALIDATION SITE 94	1	23MAY01A	21AUG01A
1025	AGENCY RECOMMENDATION ON 94 SAMPLE DATA	0		24SEP01A
1030	UPDATE RD/RA DOCUMENTS	40	01OCT03	25NOV03
1055	PREPARE G6 CONSTRUCTION DOCUMENTATION	87	03NOV03*	02MAR04
1035	SUBMIT REVISED RD/RA WP TO AGENCIES	1	26NOV03	26NOV03
1040	AGENCY REVIEW REVISED RD/RA WP	22	27NOV03	26DEC03
1060	DEV BID & AWARD SITE 84 REMEDIATION ACTIV	62	02DEC03*	25FEB04
1045	COMMENT INCORPORATION GRP 6 RD/RA WP	22	29DEC03	27JAN04
1050	FINALIZED GRP 6 REVISED RD/RA WP SENT TO AGENC.	1	28JAN04	28JAN04
1065	MOBILIZE G6 CONTRACTOR FOR SITE 84	5	03MAR04*	09MAR04
1085	AGENCY NOTIFICATION 14-DAYS PRIOR TO SAMPLING	0		09MAR04
1070	EXCAVATION/ASSESSMENT G6 BY SUB	50	10MAR04	18MAY04
1075	TREATMENT & DISPOSAL G6 SITE 84 BY SUB	60	19MAY04	10AUG04
1080	PERFORM G6 GEOPHYSICAL SWEEP	5	19MAY04	25MAY04
1090	PERFORM POST SAMPLING SITE 84&94	5	26MAY04	01JUN04
1100	SAMPLE ANALYSIS AND VALIDATION	50	02JUN04	10AUG04
1105	SUBMIT SAMPLING DATA TO AGENCIES	0		10AUG04
1200	AGENCY REVIEW OF SAMPLING DATA	10	11AUG04	24AUG04
1107	REC'D AGENCY COMMENTS ON SAMPLING DATA	0		24AUG04
1110	SITE RECLAMATION FOR SITE 84 & 94	19	25AUG04	20SEP04
1095	DEMOBILIZATION	8	21SEP04	30SEP04
1115	REMEDIAL ACTION COMPLETE	0		30SEP04
1120	PERFORM PREFINAL INSPECTION.	3	01OCT04*	05OCT04
1125	PREPARE PREFINAL INSPECTION REPORT	15	06OCT04	26OCT04
1130	ORB REVIEW OF PREFINAL INSPECTION REPORT	20	27OCT04	23NOV04
1135	SUBMIT DRAFT PREFINAL INSPECTION RPT TO AGENCIES	0		23NOV04
1140	PERFORM CORRECTIVE ACTIONS	20	24NOV04	21DEC04
1145	AGENCY FINAL INSPECTION	5	22DEC04	28DEC04
1150	PREPARE DRAFT REMEDIAL ACTION REPORT	21	29DEC04	26JAN05
1155	ORB REVIEW OF DRAFT RA RPT	20	27JAN05	23FEB05
1160	SUBMIT DRAFT RA REPORT TO AGENCIES	0		23FEB05
1165	AGENCY REVIEW OF DRAFT RA REPORT	45	24FEB05	09APR05
1170	INCORPORATE COMMENTS	45	10APR05	24MAY05
1175	SUBMIT DRAFT FINAL RA RPT	0		24MAY05
1180	AGENCY REVIEW OF DRAFT FINAL RA RPT	15	25MAY05	08JUN05
1185	INCORPORATE COMMENTS	15	09JUN05	23JUN05
1190	SUBMIT FINAL REMEDIAL ACTION REPORT	0		23JUN05
1195	OU-3-13 GROUP 6 PROJECT COMPLETE	1	24JUN05	24JUN05



Start Date 01OCT00
Finish Date 24JUN05
Data Date 01OCT03
Run Date 05NOV03 10:12

Early Bar
Progress Bar
Critical Activity

ST84

Sheet 1 of 1

BBWI

GROUP 6 RD/RA WORK PLAN SCHEDULE

05NOV03 10:12

INEEL
Idaho National Engineering and Environmental Laboratory

Appendix C

Prefinal Inspection Checklist

DRAFT PREFINAL CHECKLIST

Inspection Items		**Incomplete**	**Complete**	
Item	**RD/RA Section**			**Comments/Corrective Actions**
Site Survey and Sampling				
Magnetometer/Geophysical surveys have been completed to verify all cylinders have been removed from areas CPP-84 and CPP-94.	3.3.3			
All anomalies identified from surveys have been addressed.	3.3.3			
Soil sampling has been conducted of the excavation floor in accordance with the requirements of the *Preliminary Characterization Plan* (INEEL/EXT-2000-00398)	7.4.1			
Soil samples have been analyzed for appropriate COPCs at an approved off-site laboratory.	7.4.1 and 7.4.2			
Concentrations of soil contaminants in the excavation area are within acceptable remediation limits.	7.6			

Inspection Items		Incomplete	Complete	
Item	**RD/RA Section**			**Comments/Corrective Actions**
Backfill and Grading				
Backfill material used in the excavated areas is suitable to minimize the potential for subsidence.	6.16			
Backfilling was completed by placing the backfill material into the excavation area in 8-inch loose lifts then compacting it to approximately 90-percent of maximum dry density.	7.6			
Site has been graded back to the original grade.	7.6			
The site has been revegetated with native species in accordance with the *Guidelines for Revegetation of Disturbed Sites at the INEEL* (Anderson and Shumar 1989)	7.6			

Inspection Items		**Incomplete**	**Complete**	
Item	**RD/RA Section**			**Comments/Corrective Actions**
Waste Management				
All cylinders amenable to on-site treatment have been treated.	3.1.3 and 7.3			
Cylinders not amenable to on-site treatment are either being managed in complaint on-site storage areas, or have been shipped to an appropriate off-site facility.	WMP 6.6			
Empty cylinders meeting the CFA Landfill Waste Acceptance Criteria have been disposed of.	3.1.3 and 7.5			
Empty cylinders pending disposition in the ICDF are being managed in compliant storage.	WMP 6.3			
All other waste items generated during the course of the removal action have been properly characterized and managed.	WMP3.1.7			
All equipment used to complete the removal action has been properly decontaminated and has been removed from the site.	6.15			
Any spills and releases that may have occurred during the course of the project were properly reported and have been appropriately cleaned up.	6.17			
Additional Comments:				**Concurrence** **Date**
				US EPA:

Inspection Items		Incomplete	Complete	
Item	RD/RA Section			Comments/Corrective Actions
				IDEQ:
				DOE-ID:
				BBWI:

Appendix D

CPP-94 Accelerated Remedial Action Scope of Work

CPP-94 Accelerated Remedial Action Scope of Work

09/27/20[illegible]

STATEMENT OF WORK

CPP-94 Accelerated Remedial Action Implementation

Waste Area Group #3 - Group 6 – Buried Gas Cylinders

BACKGROUND

In 1991, an agreement was reached between the U.S. Department of Energy Idaho Operations Office (DOE-ID), the U.S. Environmental Protection Agency (EPA) Region 10, and the Idaho Department of Health and Welfare (IDHW) to ensure that the environmental impacts associated with the releases or threatened releases of hazardous substances at the Idaho National Engineering and Environmental Laboratory (INEEL) are thoroughly investigated and that appropriate response actions are taken. This agreement, called the Federal Facility Agreement and Consent Order (FFA/CO), defined 10 Waste Area Groups (WAG) and various operable unit (OUs) within each WAG. The Idaho Nuclear Technology and Engineering Center (INTEC) (formerly the Idaho Chemical Processing Plant) is identified in the FFA/CO as Waste Area Group (WAG) 3.

The WAG 3 OU 3-13 Final Record of Decision (ROD) (DOE/ID-10660) was signed by the regulatory agencies in September 1999. This ROD has documented selected response actions designed to reduce the potential threats to human health and/or the environment to acceptable levels. The remedial actions documented in the OU 3-13 ROD were chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 The selected remedial actions are also intended to satisfy the requirements of the FFA/CO. The decisions are based on the Administrative Record for WAG 3, OU 3-13.

Also in the ROD are seven groupings of WAG 3 release sites. Group 6 addresses Buried Gas Cylinders. The Buried Gas Cylinders pose a safety hazard to inadvertent intruders (i.e., backhoe operators or drillers). The cylinders are presumed to be pressurized and could burst during excavation. In addition, hydrofluoric acid (HF), which may be present in the cylinders, is very corrosive, reacts violently with moisture, and can generate explosive concentrations of hydrogen gas. The selected remedy/response action for Group 6 Buried Gas Cylinders is Removal, Treatment, and Disposal. This alternative includes:

- Remove the gas cylinders using a Subcontractor specializing in gas cylinder removal
- Treat the cylinder contents, if necessary
- Recycle or dispose of the empty gas cylinder containers in an approved TSD.

SCOPE OF WORK

Introduction

Bechtel BWXT Idaho, LLC (BBWI), the Management and Operating Contractor for the Department of Energy (DOE) at the INEEL requires a Subcontractor for planning and implementing a remedial action at two CERCLA regulated compressed gas cylinder waste sites. The sites are located within INEEL boundary. The INEEL is located in the Southeastern Idaho approximately 50 miles west of Idaho Falls, Idaho. The waste site is believed to contain four HF cylinders approximately 12 inches in diameter by 48 inches in length. This site is referred to as CPP-94. The CERCLA waste site is part of the Waste Area Group 3, OU 3-13, Group 6. The Group 6 site is considered remote. CPP-94 is approximately 1.5 miles northeast of the INTEC with no paved access or utilities. (see Figures 1 and 2).

Accelerated Removal at CPP 94

Limiting Conditions:

A. The contractor shall only remediate/treat cylinders with working valves or valves that can be refurbished to work safely.
B. Any treatment processes shall be subject to approval by the regulatory agencies. BBWI shall be responsible for obtaining written agency approval or the treatment process

The Subcontractor shall provide labor, material, equipment, and supplies to perform an accelerated excavation, physical evaluation and retrieval of four potential HF cylinders at CPP-94. One cylinder at CPP-94 is on the soil surface and the other three are partially exposed. The Subcontractor shall also be responsible for placing the cylinders in a safe storage condition at the WAG 3 CERCLA Storage Area within the INTEC facility. The subcontractor shall excavate and retrieve any additional cylinders or related hazardous debris that may be encountered during excavation. Prior to any movement or transport of the cylinders the physical evaluation shall be completed by the Subcontractor. The evaluation results must determine that the container integrity allows for safe handling.

BBWI will provide a high resolution geophysical map with the cylinder locations and land survey coordinates. The Rapid Geophysical Surveyor used at 94 is a proprietary magnetic system, and provides data on a 6 inch by 20 inch grid.

The CPP-94 activities shall be conducted in accordance with the INEEL Standard 101 Work Controls, DOE/ID10587 Quality Assurance, and INEEL/EXT-97-00032 Project Implementation, requirements. The Subcontractor must have written procedures in place documenting safe handling and retrieval practices storage requirements and transportation of compressed gas cylinders. The Subcontractor shall provide detailed input on the excavation and evaluation criteria. BBWI will input the information into the work package. Subcontractors written procedures on excavation, handling, packaging, and transportation shall be provided. The subcontractor shall also review the attached Health and Safety Plan and shall provide input to the plan so as to apply to this project and submit to BBWI for approval.

The Subcontractor shall mobilize to CPP-94. The Subcontractor shall unearth the cylinders. The Subcontractor shall then perform a visual examination of the cylinders and document all applicable characteristics, (valve configuration, container construction, integrity, labeling, corrosion effects etc). The results of the examination will be used by BBWI to determine the storage option. The Subcontractor shall be responsible for placing cylinders into a safe storage condition. One of three options are possible for safe storage condition: (1) a depressurized state with the four potential HF cylinder valves removed and the inside of the cylinder open to atmosphere with the gasses recaptured (2) placement of the cylinders in an overpack container capable of safely controlling pressurized HF gas cylinders and transport to CERCLA waste storage area CPP-92. (3) Over pack the cylinders and ship to a BBWI approved Treatment Storage and Disposal Facility. The Subcontractor shall provide a cost estimate for each option. The subcontractor shall also be responsible for disposal of any recaptured HF or other gasses.

Note: If container degradation prohibit handling and placement in an over pack option (1) shall be implemented.

If an over-pack is used the subcontractor shall be responsible for transporting the cylinders to an INEEL CERCLA Waste Storage Area at INTEC. BBWI will prepare a waste profile for storage. The cost for purchase or rental of over-pack containers is required in the Subcontractor proposal.

If the cylinders are depressurized the Subcontractor will be responsible for transporting the cylinders to an INEEL CERCLA Waste Storage Area at INTEC. BBWI will prepare a waste profile for storage. The Subcontractor will also be responsible for disposal of any recaptured HF gas.

Note: Results from the Portable Isotopic Neutron Spectroscopy testing at CPP-94 indicate a strong fluorine peak and the probability of HF gas is high.

Accelerated Removal Schedule:
Included in attachment 5
(Note: The schedule of the OU 3-13 Group 6, activities must be compliant with the *Remedial Design / Remedial Action Scope of Work for Waste Area Group 3, Operable Unit 3-13*, [DOE/ID-10721, Revision 1, February 2000])

Deliverables

Accelerated Removal at CPP-94
Excavate four compressed gas (HF) cylinders from Operable Unit 3-13, Group 6, waste site CPP-94. Excavation shall be minimal to allow for physical evaluation. Includes task completion and signoff by BBWI.

Perform a visual examination of the cylinders and produce and issue an examination report to BBWI. As a minimum, the report will detail cylinder information, color, wall thickness, valve configuration, pressure rating.

Place the cylinders into a safe storage condition per Option 1 ,2, or 3 described above. If option 1 is used, this deliverable includes disposal of any residual or recaptured HF gasses. If option 2 is used, this deliverable includes transport of the cylinders to the waste storage area. If option 3 is used a BBWI approved TSD facility must be identified.

REGULATORY AND TECHNICAL REQUIREMENTS

1. DOE Explosive Safety Manual, Rev. 8, DOE M 440.1-1, March 29, 1996
2. 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response
3. 40 CFR 300, National Oil and Hazardous Substances Pollution Contingency Plan
4. Guidance on Expediting Remedial Design and Remedial Action, EPA 540/G-90-006, August 1990
5. Checklist of Subcontractor Requirements for On-Site Work, INEEL Form 540.10
6. EPA Quality Assurance / Quality Control Guidance for Removal Activities: Sampling QA and QC Plan and Data Validation Procedures, EPA 540/G-90-004, April 1990
7. 40 CFR 263, Standard Applicable to Transporters of Hazardous Waste
8. 40 CFR 263.20, The Manifest System
9. 29 CFR 1926, Safety and Health Regulations for Construction
10. Per the Office of Nuclear Safety, Issue No. 96-03, June 1996: "This Notice applies to DOE facilities that use, store, or transport cylinders containing compressed gases."
11. Department of Transportation — Interstate transportation of compressed gas cylinders is regulated by 49 CFR 100 to 179. These regulations refer to Compressed Gas Association CGA P-1-1991 for transportation of compressed gas cylinders.
12. Occupational Safety and Health Administration — Employee safety is governed by the Department of Labor. Marking, storage, labeling, and handling are governed by OSHA regulations as stated in 29 CFR 1910. The requirements of 29 CFR 1910.101, state that in-plant handling, storage, and use of compressed gases in cylinders shall comply with Compressed Gas Association CGA P-1-1991.
13. Handbook of Compressed Gases, Third Edition, Compressed Gas Association, Arlington, VA, Van Nostrand Reinhold, NY 1990
14. Guide to Safe Handling of Compressed Gasses, Third Printing, Matheson Products, Inc, 1983
15. American Society for Testing and Materials (ASTM), D-323
16. 17DOE 5480.23, Nuclear Safety Analysis Reports
17. Code of Federal Regulations 49 CFR 100-170, Transportation
18. Code of Federal Regulations 29 CFR 1910, General Industry
19. Code of Federal Regulations 29 CFR 1910.101, Compressed Gas Association, CGA P-1 - 1991 Safe Handling of Compressed Gases in Containers
20. Code of Federal Regulations 49 CFR 173.304, Qualification, Maintenance and Use of Cylinders

SPECIAL CONSIDERATIONS

Health and Safety

The Subcontractor shall follow the requirements set forth by Form 540.10 (Subcontractor Requirements Checklist).

The Subcontractor shall meet the BBWI environmental health and safety requirements and use by the INEEL/EXT-2000-00270 HASP as a guide (see Attachment 3). Prior to the start of field operations for any portion of this Statement of Work, the Subcontractor shall review and work to existing health and safety documents pertaining to this site.

The Subcontractor shall follow the requirements set forth by INEEL Standard 101 Work Controls and the associated work package as directed by BBWI.

Training and Access Requirements (see Attachment 4)

Attachment 4 lists training and access requirements that the Subcontractor must follow.

Schedule

Attachment 5 shows the schedule for this project.

Applicable Documents

OU 3-13 Record of Decision, DOE/ID-10660, Revision 0, October 1999
OU 3-13 Statement of Work, DOE/ID-10721, Revision 1, February 2000

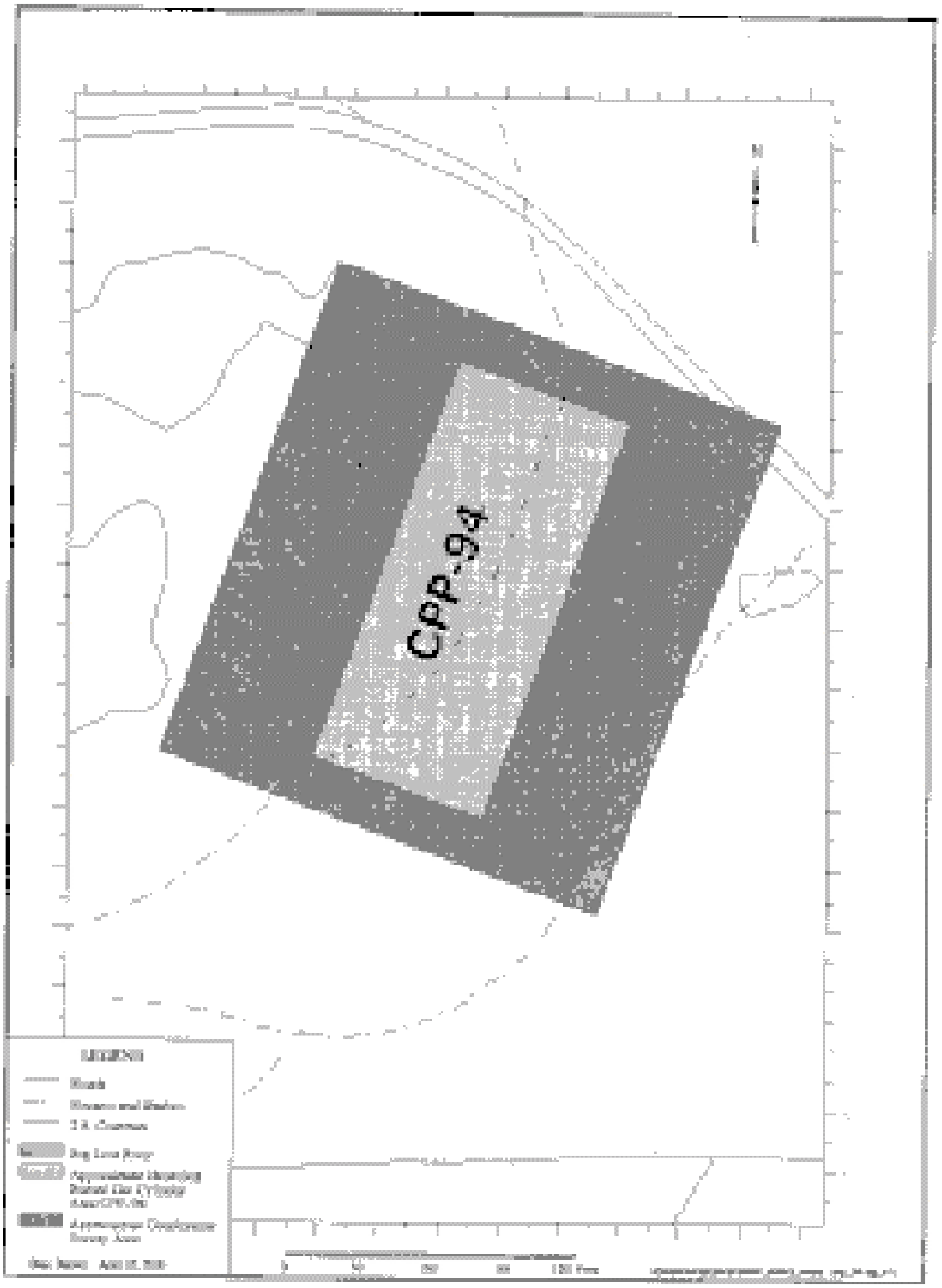


Figure 2. Location of Waste Area CPP-94.

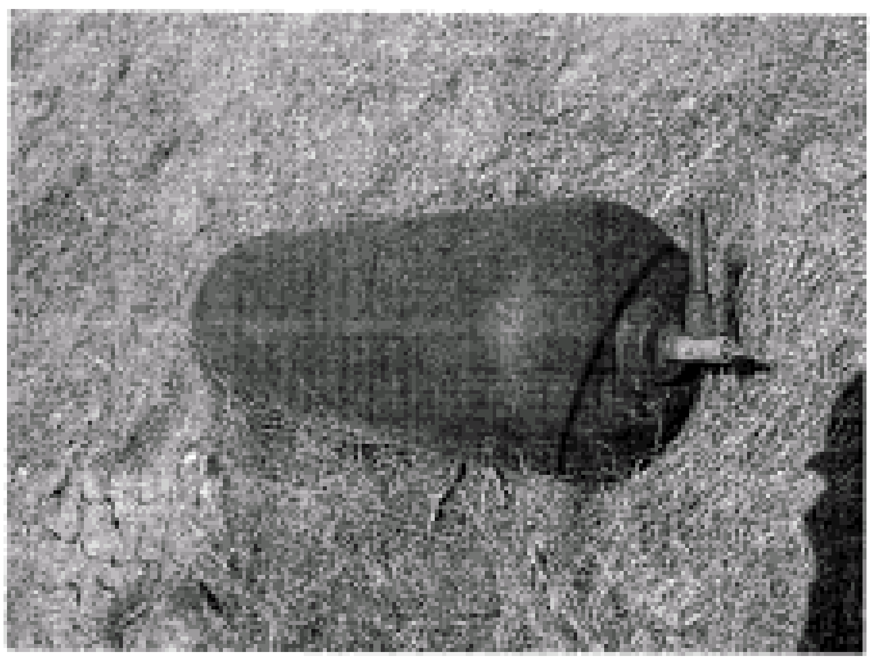


Figure 3. Compressed gas cylinders to be remediated.

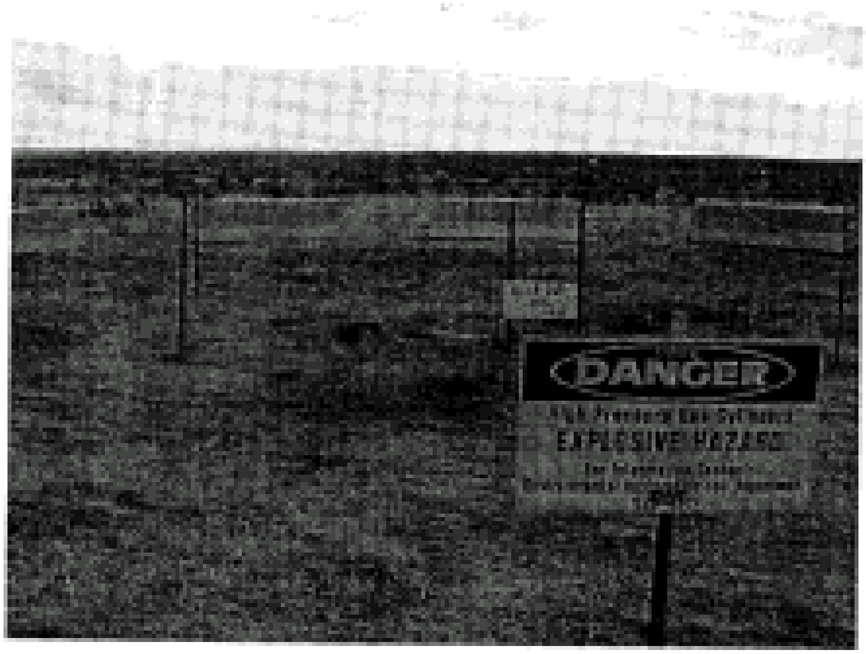


Figure 3. (Continued)

Attachment 1

Applicable or Relevant and Appropriate Requirements (ARARs)

Compliance with ARARs for Group 6—Buried Gas Cylinders Selected Remedy.

Alternative/ARARs citation	Description	Applicable, or Relevant and Appropriate (R&A), or TBC	Comments
Action-specific			
IDAPA 16.01.01.650, 16.01.01.651	Idaho fugitive dust emissions	Applicable	Will be met during excavation and disposal using dust suppression
IDAPA 16.01.01.585, 16.01.01.586	Rules for control of air pollution in Idaho	Applicable	Will be met during treatment of tank contents
40 CFR 122.26	Storm water discharges during construction	Applicable	Will be met through engineering controls during excavation and construction
IDAPA 16.01.05.008 (40 CFR 264.114)	Disposal or decontamination of equipment, structures, and soils	Applicable	Applies to equipment used to treat or handle hazardous materials in the cylinders
40 CFR 300.440	Procedures for Planning and Implementing Offsite Response Actions	Applicable	Applies only to offsite disposal of the cylinder contents
IDAPA 16.01.05.005 (40 CFR 261.20 through 24)	Hazardous waste characteristics identification	Applicable	Applies for hazardous waste contaminated soils that are excavated and managed on-site
IDAPA 16.01.05.005 (40 CFR 261.7(a)(1), (b)(2))	Residues of hazardous waste in empty containers	Applicable	Applicable to empty containers and compressed gas cylinders
IDAPA 16.01.05.008 (40 CFR 264.170 through 179)	Use and Management of Containers	Applicable	Substantive requirements will be met for treatment, storage, disposal and transportation of RCRA hazardous cylinder contents or hazardous waste contaminated soils
IDAPA 16.01.05.011 (40 CFR 268)	Land disposal restrictions	Applicable	Applies only to the treatment and disposal of hazardous waste contaminated soils
IDAPA 16.01.05.011 (40 CFR 268.49)	Alternative LDR treatment standards for contaminated soil	Applicable	Applies only to the treatment and disposal of hazardous waste contaminated soils
IDAPA 16.01.05.008 (40 CFR 264.553)	Temporary units	Applicable	Applies to the storage and treatment of hazardous remediation media
IDAPA 16.01.05.008 (40 CFR 264.554)	Remediation waste staging piles	Applicable	Applies to the staging of hazardous remediation soils/debris

Alternative/ARARs citation	Description	Applicable, or Relevant and Appropriate (R&A), or TBC	Comments
IDAPA 16.01.05.008 (40 CFR 264 Subpart X)	Miscellaneous units	Applicable	Applies to hazardous wastes that are stored, treated or disposed.
IDAPA 16.01.05.008 (40 CFR 264 Subpart J)	Tank systems	Applicable	Applies to hazardous wastes that are stored, treated or disposed.
IDAPA 16.01.05.008 (40 CFR 264 Subpart BB)	Air emission standards for equipment leaks	Applicable	Applies to hazardous wastes that are stored, treated or disposed.
IDAPA 16.01.05.008 (40 CFR 264 1080 through 1082)	Air emission standards for tanks, surface impoundments, and containers	Applicable	Applies to hazardous wastes that are stored, treated or disposed.
IDAPA 16.01.05.008 (40 CFR 264.310)	Landfills	Applicable	Applies only if cylinders are capped in place.
Chemical-specific			
IDAPA 16.01.05.005 (40 CFR 261)	Identification of Hazardous Waste	Applicable	Applies of soils containing hazardous waste area encountered
Location-specific			
None identified			
TBCs			
None identified			

Attachment 3

Health and Safety Plan

Note: Awardee will be provided with an electronic copy of this plan.

Attachment 4

Personnel Training

All project personnel shall receive training as specified in OSHA 29 CFR 1910.120/1926.65 and the BBWI *Safety and Health Manuals*. Radiation workers shall be trained according to the BBWI *Radiation Protection Manual*, MCP-126, "Training." Table 4-1 summarizes training requirements for project personnel. Specific training requirements for each worker may vary depending on the hazards associated with their individual job assignment and required access into radiological controlled areas.

Proof that all required training courses have been completed (including applicable refresher training) must be maintained on the project at all times. Examples of acceptable written training documents include: BBWI, "40 Hour OSHA HAZWOPER Card," BBWI, "Respirator Authorization Card," "DOE Certificate of Core Radiological Training II Card," "Medic/First Aid Training Card," and/or a copy of an individual's or department's (BBWI) TRAIN System printout demonstrating completion of training. A copy of the certificate issued by the institution where the training was received is also acceptable proof of training. The DOE radiological worker training must be documented on an official authorized card and have the designated INEEL site-specific training stamped or written on the card (unless issued prior to March 1997).

Before beginning work at the project, project-specific training will be conducted by the FTL and/or HSO. This training will consist of a complete review of this HASP and attachments, with time for discussion and questions. At the time of this training, personnel training records will be checked and verified to be current and complete for all required training shown in Table 4-1. Upon completing project-specific training, personnel will sign a training acknowledgement roster (Form 361.02) indicating that they have received this training, understand the tasks and associated hazards that will be conducted, and agree to follow all HASP and other safety requirements.

If not previously completed, each 40-hour trained HAZWOPER worker's complete the HAZWOPER initial 24-hour supervised field experience training. The worker will be monitored by the FTL and/or HSO for 3 days of site activities for satisfactory work performance. For 24-hour trained HAZWOPER workers, the same procedure will be followed, except the supervised field experience will only last 1 day.

The FTL, HSO, RCT, and JSS, as applicable, will conduct a daily prejob safety briefing of the task(s) to be performed that day. During this briefing, tasks are to be outlined, hazards identified, hazard controls and work zones established, PPE requirements discussed, and employees' questions answered. At the completion of this briefing work control documents will be read and signed (SWP[s], RWP[s], etc.). Particular emphasis will be placed on lessons learned from the previous day's activities and how tasks can be completed in the safest, most efficient manner. All personnel will be asked to contribute ideas to enhance worker safety and mitigate potential exposures at the project.

Table 1. Required training for project personnel

Task/Position (Topic)	FTL, CC, JSS, or HSO (Required)	Field Team (Required)	Nonworkers[a] (Required)	Visitors[b] (Required)
Project-specific training[c]	X	X	X	X
Decontamination (HASP Section 10)[d]	X	X	X	X
Hazard communication[d]	X	X	X	X
Fire extinguisher training[d]	X	X	X	X
Project control and warning devices[d]	X	X	X	X
HASP Emergency Response plan (Section 11)[d]	X	X	X	X
40-hour HAZWOPER[e]	X	X		X[g]
24-hour HAZWOPER occasional worker[f]	—	—	X	X[g]
8-hour HAZWOPER site supervisor	X	—	—	—
Hearing conservation[g]	X	X	X	X
Asbestos awareness[g]	X	X	X	X[g]
DOE Radiological Worker II/Radiological Worker I[g]	X	X	X	—
CPR and medic first aid[h]	X	—	—	—
Respirator qualification and fit test[i]	X	X	—	—
HAZMAT employee general awareness training[j]	X	X	—	—

a. Nonworkers (occasional project workers) who must enter the EZ are required to have the training necessary to perform their assigned tasks within the EZ. This may include the same training as FTL (depending on the task location) and directions by the HSO, RI & RCT.)
b. Visitors are required to meet the nonworker training requirements, at a minimum, if they enter the EZ.
c. Training will be documented using Form 361.02.
d. Will be included in project-specific training.
e. Includes 40 hours of classroom instruction and 24 hours of supervised field experience. [a]
f. Includes 24 hours of classroom instruction and 8 hours of supervised field experience. [a]
g. As required based on project duties and site zone access requirements.
h. Two Medic First/CPR qualified individuals must be present during site activities.
i. If entering areas requiring respirator use.
j. If identified as "HAZMAT" employee (i.e., anyone who directly affects hazardous material transportation safety by handling, packaging, labeling, loading, unloading, moving, driving, etc. [per 49 CFR 171.8]).

Attachment 5

Project Schedule By Phase

Date	Activity
	Phase I
Within one week of award	Kickoff meeting (includes a site walkdown)
10-4-2000	Submit plans/procedures for BBWI approval
10-9-2000	Contractor mobilization
10-10-2000	Work control package walkdown
10-20-2000	Complete accelerated removal and safe storage of HF cylinders from CPP-94

INEEL Accelerating the Remediation at a

Buried Compressed Gas Cylinder Site

An accelerated remedial action at one Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site at the Idaho National Engineering and Environmental Laboratory (INEEL) is being implemented. The site, known as CPP-94, is part of the Waste Area Group 3, Operable Unit 3-13, Group 6 and is located about 1 mile northeast of Idaho Nuclear Technology Engineering Center (INTEC).

CPP-94 is in an off-road area and is presumed to contain four compressed gas cylinders that were abandoned sometime in the early 1950s. The main area of the site (about 10 × 20 ft) contains one fully exposed and two partially exposed gas cylinders. The fourth cylinder is located about 40ft northeast of the main area. Based on cylinder markings and preliminary characterization results, the cylinders are believed to contain hydrofluoric acid (referred to as HF). HF is a highly corrosive chemical that can pose a significant threat to humans upon contact or inhalation. Fluoride, a residual chemical of HF reactions, is a potential health and ecological hazard. In addition to the chemical hazard posed by HF, pressurized gas cylinders are considered an acute safety hazard if ruptured.

The decision to accelerate the CPP-94 remedial action and safely dispose of the cylinders and their contents is based upon several factors. Initially, the threat posed by summer range fires at the INEEL was the primary driver. The concern was evaluated by DOE and BBWI upper management in response to a DOE-HQ request for an evaluation of the INEEL for range fire vulnerability. A range fire at CPP-94 would not only increase the potential for cylinder rupture and the chemical release of HF into the environment, but it may also threaten fire fighting crews and equipment operators in the area. Although, the CPP-94 area has postings indicating the threat posed by the cylinders, the remoteness and unconfined assembly of the cylinders can still pose a threat to vehicles or field workers not familiar with the hazard while working under emergency conditions. The original remediation schedule did not complete the remediation until August 2001. The August start date for field activities would leave the cylinders vulnerable for another fire season. An additional benefit of the accelerated remedial action is that the timing of the field activities during colder months will complement the methodology used for implementation. As air temperature decreases, gas pressure inside the cylinder will also decrease and reduce the risks posed by over-pressurization, (i.e. $P1 \times T1 = P2 \times T2$). If the remedial action is performed when air temperatures are <67°F, costly steps of cylinder cooling are avoided and potential thermal embrittlement of the steel container is also avoided.

Efforts already undertaken at CPP-94 (site assessment and characterization, removal of nearby vegetation to reduce fuel for rangefires, placement of signs and barriers to prevent entry) are only temporary in nature. The accelerated remediation of the cylinders will eliminate the human health and environmental threat posed by the cylinders in a timely and cost saving manner.

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⇒ **Emergency Condition # 1, Cylinder shows signs of Bulging.**

- Once the Visual inspection is completed, the next step is to start the Ultrasonic procedure, refer to Appendix C.
- Install the cylinder lift device, once completed, one end of the rope will be attached to the lifting device and the other end of the rope will be attached to the forklift.
- Radio confirmation with the INEEL support group that the cylinder lift procedure willcommence.
- Lift the cylinder to a 45 degree angle, stop, from behind Lexan shields, do air monitoring with Hydrogen Fluoride color metric tubes, check LEL/O2 readings, look for signs of chemical release. All ok, continue to lift the cylinder to an upright position, after the cylinder is in an upright position, do air monitoring with Hydrogen Fluoride color metric tubes, check LEL/O2 readings, look for signs of chemical release.

⇒ **Emergency Condition # 2, Cylinder Contents release during Excavation.**

- Complete Visual inspection on the cylinder, refer to Appendix B.
- Once the Visual inspection is completed, the next step is to start the Ultrasonic procedure, refer to Appendix C.
- Install the cylinder lift device, once completed, one end of the rope will be attached to the lifting device and the other end of the rope will be attached to the forklift.
- Radio confirmation with the INEEL support group that the cylinder lift procedure will commence.
- Lift the cylinder to a 45 degree angle, stop, from behind Lexan shields, do air monitoring with Hydrogen Fluoride color metric tubes, check LEL/O2 readings, (or Direct reading instrument by INEEL), look for signs of chemical release. All ok, continue to lift the cylinder to an upright position, after the cylinder is in an upright position, do air monitoring with Hydrogen Fluoride color metric tubes, check LEL/O2 readings, look for signs of chemical release.

⇒ **Emergency condition # 3, Release during the lifting of the cylinder.**

- Follow the Visual inspection procedure, if the cylinder fails, follow the flow diagram.
- If the cylinder passes, go to the next step on the flow diagram, Manifold Procedure.

- Set up the valve to accept the manifold fitting, watch for any signs of leaks or gas release, continue the air monitoring. Notify the support personnel.

⇒ **Emergency condition #4, Manifold attachment procedure.**

- Attach the manifold following the manifold procedure, see Appendix E.
- Watch for any signs of leaks or gas release, continue the air monitoring. Notify the support personnel.
- The next step is to pressure check the cylinder following the manifold procedure. Following the flow chart, determine pass or fail and continue to next step.

⇒ **Emergency Condition # 5, Release during Pressure check.**

- The next step is to pull a sample from the cylinder into the sample cylinder, follow the manifold procedure.

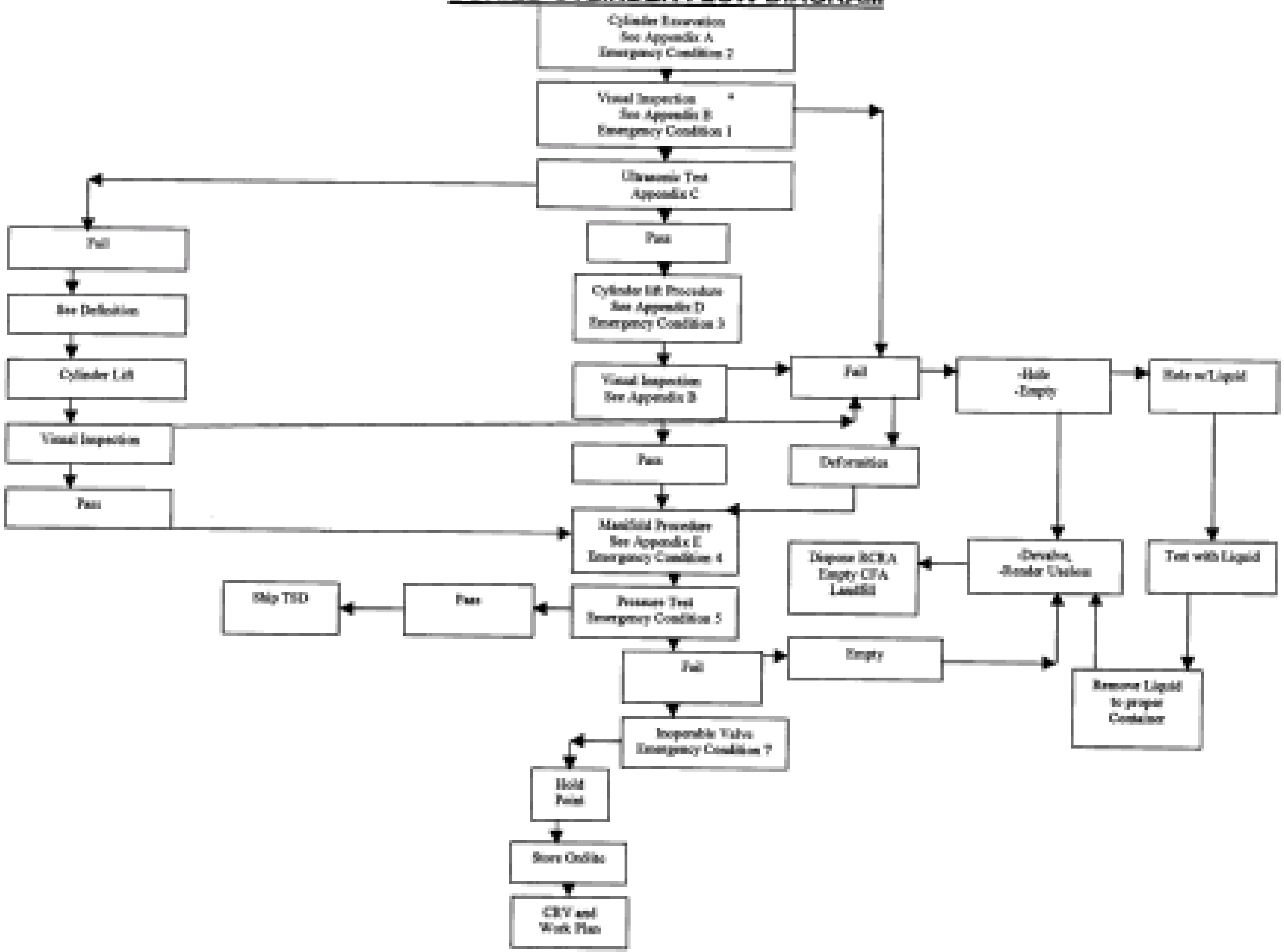
⇒ **Emergency Condition # 6, Release during Sampling.**

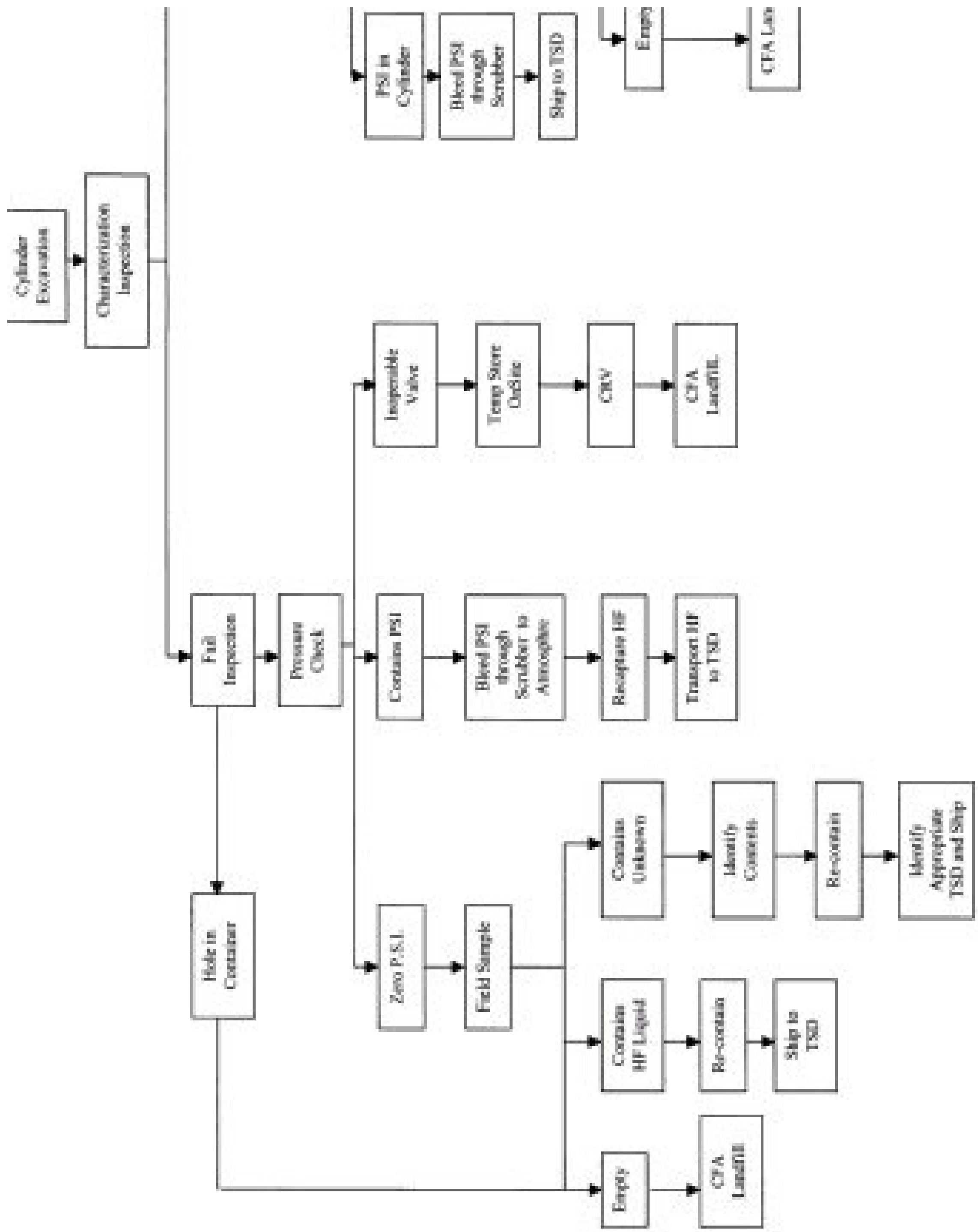
- If it is determined that the cylinder valve is inoperable, refer to the valve removal procedure, Appendix F.
- Notify support personnel of valve removal procedure.
- Prepare cylinder for valve removal procedure.
- Start valve removal process.

⇒ **Emergency Condition # 7, Release during Valve Procedure.**

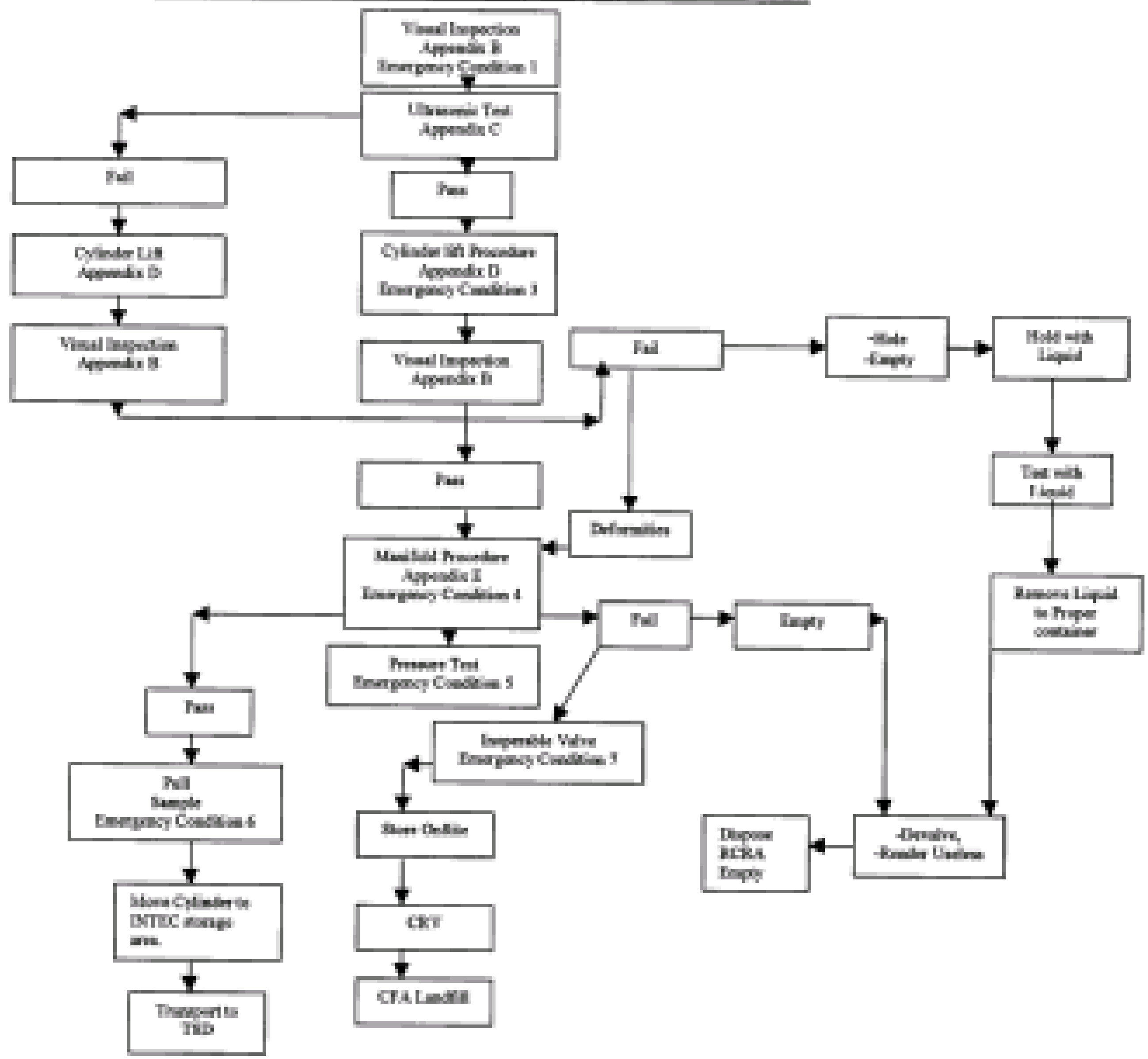
- When valve replacement is completed, re-attach the manifold and pull a sample from the cylinder.

BURIED CYLINDER FLOW DIAGRAM




Cylinder Excavation
Characterization Inspection
Full Inspection
Pressure Check
Hole in Container
Inoperable Valve
Temp Store OnSite
CRV
CFA Landfill
Contains PSI
Bleed PSI through Scrubber to Atmosphere
Recapture HF
Transport HF to TSD
Zero P.S.I.
Field Sample
Contains Unknown
Identify Contents
Re-contain
Identify Appropriate TSD and Ship
Contains HF Liquid
Re-contain
Ship to TSD
Empty
CFA Landfill
PSI in Cylinder
Bleed PSI through Scrubber
Ship to TSD

CYLINDER ABOVE GROUND CYLINDER FLOW DIAGRAM



Appendix E

Treatment of Non-Anticipated Gases

Treatment of Non-Anticipated Gases

Introduction

On June 10, 2004, excavation activities at Site CPP-84 of OU 3-13, Group 6, Buried Gas Cylinders, uncovered cylinders suspected of containing non-anticipated gases, including hydrofluoric (HF) acid and chlorine. After mitigating hazards associated with the suspected hazardous gas cylinders, physical work to safely stage these cylinders resumed on June 24, 2004. During movement of one of the suspected HF acid cylinders, the cylinder ruptured through the side, releasing a small plume of gas. Per the Emergency Action Plan for this work, the field personnel informed support personnel monitoring the work from the site control trailer of the leak. The subcontract technical representative made notification calls and the support personnel evacuated the area. At 1341, June 24, 2004, a Site Area Emergency was declared. The personnel working with the leaking HF cylinder placed the cylinder into an overpack (that had been staged near the work area), performed required decontamination activities, and evacuated the area. The gas in the overpack was later sampled and confirmed to be HF acid.

Treatment of cylinders containing HF acid and chlorine will be conducted on-Site. This is due to the questionable physical condition of the cylinders and the inability to safely transport them to an off-Site treatment facility. The cylinders are described as large (15-in.) low-pressure cylinders. While overpack devices are available for 10-in. cylinders, Department of Transportation (DOT) -exempt overpack devices for 15-in. low-pressure cylinders are not available to safely transport the cylinders off-Site for treatment.

On-Site Treatment Method

The on-Site treatment method utilizes a self-contained mobile treatment system called a Cylinder Management Device (CMD) III, a proprietary unit of the current subcontractor, Integrated Environmental Services (IES). The unit was designed and built to handle cylinder contents that cannot be accessed through the valve or because the cylinder is in a deteriorated or potentially dangerous condition. This system provides remotely operated means to access, sample, and treat a variety of hazardous cylinder contents (including HF acid and chlorine) in a controlled, contained environment.

CMD III System Overview

The CMD III is a double-contained system housed and transported inside a steel-lined chamber, in which a cylinder can be inserted and sealed from the environment (see Figure E-1). The system provides mechanisms to remotely clamp and drill through a cylinder and, subsequently, sample and treat the cylinder contents. Remote operations are controlled through a computer interface designed to allow the operator to view control sensors, valves, and other parameters associated with the system operation.

CMD III Sampling and Treatment Process

Once a cylinder is placed and sealed in the CMD III, remote operations to sample and treat the contents can begin. The following steps outline the general treatment processes:

1. The cylinder sidewall is hydraulically sealed to a drill throat using a soft lead gasket to create a leak-tight seal within the CMD III. The drill throat is connected to tubing leading to a sample port and the treatment system.

2. The cylinder sidewall is drilled through the drill throat.

Figure E-1. Photograph of CMD III.

3. A controlled amount of cylinder contents is collected through the sample port and analyzed to confirm/determine cylinder contents.

4. Once the cylinder contents are known, the contents of the cylinder are removed via tubing to the appropriate treatment process (e.g., neutralization using potassium hydroxide solution for HF acid, or potassium hydroxide or sodium hydroxide solution for chlorine).

NOTE: *The process operates under a high-vacuum venturi scrubber through the reactor head space and through a solid media column (e.g., potassium permanganate) to effectively remove residual gas from processed cylinders. After connection to a cylinder, the rapid flow of reagent through the venturi establishes a high vacuum. This action removes even minute quantities of residual gas from the cylinder. As the gas contacts the turbulent reagent stream, it is neutralized instantly.*

5. Once cylinder contents have been removed and treated, nitrogen can be pumped back through the drill throat into the cylinder to provide for the safe removal and handling of the cylinder carcass.

Treatment Waste Stream

The treatment waste stream will consist of a liquid waste with a pH <10 that is not a characteristic (hazardous) waste. In addition to this liquid waste stream, a minimal salt slurry may be formed during the treatment process of HF acid and/or chlorine. Following discussion with INEEL CERCLA Disposal Facility (ICDF) personnel, this waste stream may be containerized separately and absorbent added when containerized to facilitate management at the ICDF as a solid waste. Waste streams associated with the treatment of the cylinder contents will be handled in accordance with the Waste Management Plan, DOE/ID-10837.

Attachment 1

Preliminary Characterization Plan for OU 3-13 Group 6 RD/RA Buried Gas Cylinder Sites: CPP-84 and CPP-94 DOE/ID-10842

[This document was provided under separate cover.]

TO VIEW ATTACHMENT 1 SEE DOCUMENT NUMBER: DOE/ID-10842, REV.02

Attachment 2

Health and Safety Plan for WAG 3, OU 3-13, Group 6 Buried Gas Cylinders INEEL/EXT-2000-00270

[This document was provided as a separate attachment.]

TO VIEW ATTACHMENT 2 SEE DOCUMENT NUMBER: INEEL/EXT-2000-00270, REV.05

Attachment 3

Hazard Classification for Remediation of OU 3-13 Group 6 RD/RA Buried Gas Cylinders Sites: CPP-84 and CPP-94 INEEL/EXT-2000-00254

[This document was provided as a separate attachment to the original deliverable.]

Attachment 3-2

TO VIEW ATTACHMENT 3 SEE DOCUMENT NUMBER: INEEL/EXT-2000-00254, REV.00

Attachment 4

Waste Management Plan for Operable Unit 3-13, Group 6, Buried Gas Cylinders DOE/ID-10837

[This document was provided as a separate attachment.]

TO VIEW ATTACHMENT 4 SEE DOCUMENT NUMBER:
DOE/ID-10837, REV.02

Attachment 5

Data Management Plan for Field and Nonchemical Data from the Operable Unit 3-13, Group 6 Buried Gas Cylinders DOE/ID-10836

[This document was provided as a separate attachment to the original deliverable.]

Attachment 5-2

TO VIEW ATTACHMENT 5 SEE DOCUMENT NUMBER: DOE/ID-10836, REV.00